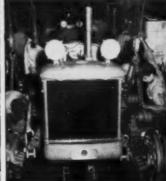
# The IRONAGE

The National Metalworking Weekly











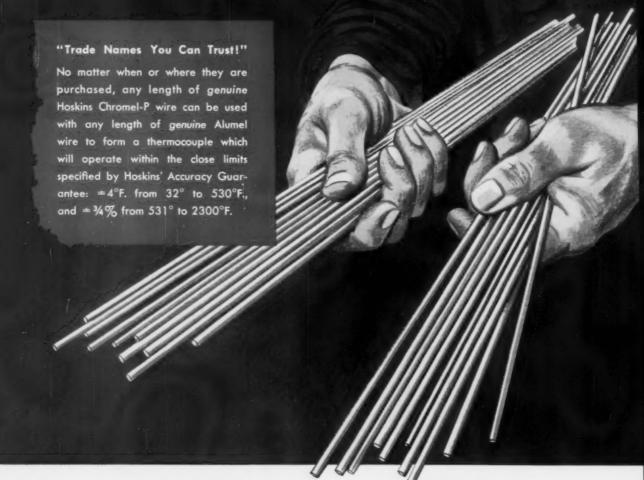




Chicago: \$10 Billion Metalworking Hub P.51

The Story Behind Higher Steel Prices P.56
"Packaged" Setups Cut Idle Machine Time P.91

Digest of the Week P-2



# HOSKINS Chromel-Alumel

THERMOCOUPLE ALLOYS

**CONSIDER** for a moment the significance of the statement made above and what it means to users of Hoskins Chromel-Alumel thermocouple alloys the world over. For example, take "The Case of the Ageless Alumel" . . .

Not long ago, an industrial concern in Japan "discovered" 265 pounds of 8-gauge wire hidden away in a remote corner of their plant. Its Inspection Tag, still intact, identified it as being Hoskins Alumel that had been purchased over 20 years ago. How it had escaped being used during all those years no one knew. Inasmuch as it was still in good usable condition, however, the company wrote to inquire if it would be practical ... or indeed even possible to have a similar quantity of 8-gauge Chromel-P wire specially processed so that its millivoltage would match that of the 1933-vintage Alumel. Imagine their surprise when they were advised that all Chromel-P alloy is specially processed by Hoskins to a uniform standard of quality, and that ... "regardless of when produced or where purchased, any length of genuine Chromel-P wire can be joined to any length of

genuine Alumel to form a thermocouple which will register true temperature-emf values within the close specified limits of Hoskins Accuracy Guarantee."

No wonder, then, that Chromel-Alumel thermocouples are the world's basic standard of accuracy for the measurement of high temperatures. No wonder that the words "Chromel-Alumel" are recognized as . . . "trade names you can trust!"

If you use thermocouples, this new manual is meant for you! It contains complete specifications on Chromel-Alumel alloys, lists temperature-millivolt equivalents, explains standardization procedures, gives much useful application data. And it's yours for the asking without obligation. Send for your free copy today!



Chromel-Alumel thermocouple alloys are produced exclusively by

### **HOSKINS MANUFACTURING COMPANY**

4445 LAWTON AVENUE . DETROIT 8, MICHIGAN



These eye-catching products are proof that steel wire can be prettied up. The candelabra and the wire dividers of the record "caddy" are finished in black bonderite, while the remaining items are plated with lustre-bright brass.

### Handsome Housewares from Bethlehem Wire

These and other attractive housewares are made by Artistic Wire Products Co., Inc., East Hampton, Conn., from steel wire which we have been supplying for about nine years. A leading manufacturer of kitchen and houseware specialties, Artistic requires a wire having a surface suitable for spotwelding and plating.

Their multiple electro-welding machines call for wire with a minimum of surface irregularities. After welding, they finish the wire with black bonderite or with metal-plating, depending upon the product. Their "Vinylmaid" line of dish drainers and other specialties are coated with vinyl plastic in popular colors to match the modern kitchen.

A big part of our job is working closely with wire users, developing the best type of wire for each different application. Whether you need one of our special-purpose wires or one of the more ordinary types, you can count on our modern wire mills to do the kind of job that will keep your steel wire problems to a minimum.

Perhaps our wire-making experience can be of help to you right now. Just phone the nearest Bethlehem sales office or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation Export Distributor: Bethlehem Steel Export Corporation



### Digest of the Week in Metalworking

Starred items are digested at right.

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### NEWS DEVELOPMENTS

### THE CASE FOR HIGHER STEEL PRICE LEVELS

P. 56

Sen. Douglas plans probe of steel prices. But facts indicate prices of materials and wages have climbed faster than steel prices. Industry contends it needs increased earnings to finance needed expansion. Even Wall Street takes dim view of steel stock potential.

### BIG RESEARCH CENTERS MARK NEW ERA FOR INDUSTRY

USS labs at Monroeville and General Motors Technical Center at Detroit



are first completely integrated research centers in nation. Their cost is high but the results are worth it.

### ENGINEERS BEING LURED BY OTHER VOCATIONS

Grass is greener elsewhere, even for engineers. Carnegie Tech survey shows. Three out of four wind up in non-technical jobs. Undergraduate studies should be broadened, specialization de-emphasized, Gulf executive

### STUDEBAKER-PACKARD LOOKING FOR NON-AUTO MERGER

Some sort of merger for S-P is definitely in the works. Sagging auto market, difficulty in obtaining \$100 million loan make merger with a nonauto producer likely.



CHICAGO is flexing its muscles industrially. And metalworking is leading the way. The midwestern metropolis is vying with Pittsburgh as the No. 1 steelmaking center. It's a boom town all over again. See story P. 51.

### HARD MONEY POLICY MAY BE EASING P. 73

Although cabinet is split on credit policies, it looks like hard money advocates may lose out. Sec. Humphrey leading voice in urging U. S. to quit tampering with credit. Besides, it's an election year and GOP doesn't want to slow business by further application of credit brakes.

### FEATURE ARTICLES

### BOOST MACHINING OUTPUT WITH 'PACKAGED' SETUPS P. 91

Frequent job changes can keep machine tools idle much of the time. Machine operators' setups can be good or bad. Either way, it wastes time, an especial problem on milling and boring jobs. One firm's answer you might apply: Take your best setup man and give him the job of packaging setups in advance for less skilled operators. He needs only a few items, quiet area to work.

### FOR HIRE: SPECIAL VACUUM CASTING SERVICE

Wondering if vacuum melting can improve your cast products? Cannon-Muskegon Corp. has the facilities to show you what these purer alloys can do for one casting—or a million. A new department specializes in making pure master alloys and vacuum casting them. Customers like products produced.

### PAINT SPRAY SETUP FEATURES QUALITY WORK P. 96

Sleek, smooth paint jobs in multiple colors help sell a lot of automobiles, require flexible, easy-to-maintain production spraying systems. These and other musts are met in paint shop at Chrysler's Canadian plant. Air to spray booths is washed, double-filtered. Functional equipment is readily accessible, paint recovery excellent.

### STOP PLAYING HIDE-AND-SEEK WITH DRAWINGS P. 10

You lose up to 20 pct of your time just searching for drawings and engineering facts. An up-to-date drawing control system can help lessen this. One installation saves 8 manhours every day on several punched card files. Each mounts microfilmed drawings and specifications.

### MILL CONTROLS TOUGHEN

STEEL PLATE

Steel plate is basically tough—but how can it be made even tougher? One mill's answer is closer rolling controls, tighter chemistry. If you're a plate user and interested in high product quality, this shop-tested approach tells how it's done. Even slab size makes its mark in providing a consistent product with superior notch toughness.

P. 104

P. 55

### MARKETS AND PRICES

### AN INSIDE REPORT ON CHILEAN COPPER

Recent developments in Chile have made U. S. companies operating there more comfortable. Currency switch is one factor. Also, longer labor contract, now 15 months, assures some semblance of labor stability.

### WEST COAST STEELMAKERS EXPECT TO BREAK RECORD P. 77

Ten pet increase over 1955 production seen if equipment holds up under the strain and labor relations remain peaceful. Construction industry makes biggest demands on west coast capacity.

### RESERVE TOOL FUNDS DOOMED BY CONGRESS P. 79

Because the armed forces have not been spending enough of the \$200 million allocated for mothball machine tool program, a new appropriation is being withheld; the unspent balance taken back.

### ARE STEEL INVENTORIES HIGH OR LOW?

HIGH OR LOW?

P. 143

It would take a steel strike to settle the question of whether consumer inventories are excessive. But chances are that customer stocks are any-

### AVAILABLE SUPPLY IS THE BIG IF IN COPPER P. 150

thing but comfortable. A strike in

the South gives first real clue.

Economist Eliot Janeway tells copper and brass executives to concentrate on availability rather than price of copper. He believes strikes are likely this year, keeping consumption below demand, holding price at 46¢. Total consumption will be up over 1955.

### NEXT WEEK:

### HOW TO GET MORE FOR YOUR HANDLING DOLLAR

This special feature combines the experts' thinking on how to tackle handling improvement programs systematically. It tells you where to dig in, what to consider in selecting various plant equipments. Clark Equipment photo.





### **OSBORN MOLDING AND CORE BLOWING MACHINES**

for continuous low-cost



• Unexcelled engineering, precise manufacture and the knowledge of how to best apply a machine to a job are three reasons why Osborn molding and core blowing machines are setting new production records . . . slashing foundry costs.

Have an Osborn foundry specialist show how you may be able to simplify molding . . . mechanize or even automate costly hand operations. Write The Osborn Manufacturing Company, Dept. FF-43, 5401 Hamilton Avenue, Cleveland 14, Obio.





Leader in precision machines for the foundry

CORE BLOWERS MOLDING MOLDING MACHINES



JOLT SQUEEZE



JOLT SQUEEZE PIN LIFT



AUTOMATIC CORE BLOWER

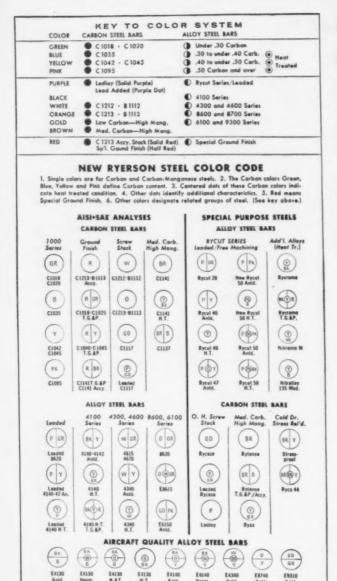


JOLT ROCKOVER



JOLT STRIPPER

# NEW COLOR CODE for steel identification



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Med H Full H Abrasion Resisting 600

### KEY TO COLOR SYMBOLS:

 A—ALUMINUM
 BK—BLACK
 GD—GOLD
 O—ORANGE
 PK—PINK
 W—WHITE

 B—BLUE
 BR—BROWN
 GR—GREEN
 P—PURPLE
 R—RED
 Y—YELLOW

God had book book book

For Stainless steels and other products, see your Ryerson Stock List

# More logical system aids quality control

Accurate identification of steel—always a point of paramount importance with Ryerson—now becomes even more meaningful than before with the introduction of a new system of color marking.

Based on logical groupings of related types of steel, this new Ryerson color code is easy to understand, remember, and use. It strengthens still further the rigid program of quality control that for years has guarded the known high uniform quality of Ryerson Certified Steel.

Here's how the system works:

- Single colors are used for standard Carbon and Carbon Manganese Steels.
- The colors Green, Blue, Yellow AND PINK always define Carbon content.
- Centered dots of these Carbon colors always indicate the heat treated condition.
- Centered dots of other than Carbon colors identify characteristics other than analysis, carbon content or the heat treated condition.
- PURPLE, BLACK, WHITE, ORANGE, GOLD and BROWN each designate a related group of steels.
- RED marking of any kind always indicates Special Ground Finish.

If you do not already have this new steel identification chart, we will be glad to send a copy (printed in full color) for your Ryerson Stock List. Call or write your nearby Ryerson plant, or write Box 8000-A, Chicago 80, Illinois.

# RYERSON

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### EDITORIAL

p

### **How Is That Confidence Boom?**

 AS A RULE, all segments of industry do not reach their peaks at the same time. It is unlikely that our economy could accommodate such a condition.

We are beginning to see statements that industry is in for "trouble." Viewers-with-alarm are beginning to crowd the business horizon.

The auto industry is singled out for special attention. It is pictured as being in the early stages of recession—or depression. Experience so far this year has been disappointing. And it is true that production looks bad compared with a year ago.

Experts are pouncing upon housing starts; pointing out that there will be less than 1.2 million against 1.375 a year ago. Some economists believe the total this year will fall below 1.1 million.

The depressing mood in the farm equipment field is sad news to implement makers. Sales are down and layoffs are increasing. The lack of rain in some sections is having adverse effects.

Now if you stop right here you are in trouble with your confidence, with your good feeling—and perhaps with your wits. Yet that is about as far as some people are thinking these days.

Let's go further. Last year was a big one for consumer and consumer-durable goods. This year will be a "good" one. There are many months left to test car sales; perhaps after September.

Housing starts are lower than a year ago, but actual spending for residential building is up—bigger and better houses. Last week housing sales and starts were perking up with the weather. The real test on housing activity is coming from here on out.

Many farmers are "on strike." All are not broke. Rain and a better market for products—and farm "relief"—will change their buying habits overnight. Machinery is as much a must to farmers as it is to industrialists—if wage costs and overhead are to be cut.

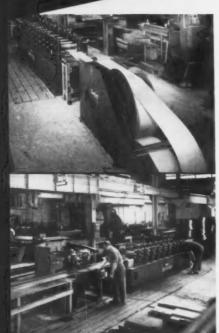
This is a heavy industry peak year. Defense activity is picking up. Plant and machinery expansion will break all records. Construction awards are reaching new highs. National income is expanding. The stage is being set for a strong "after-vacation" step up.

Don't go to the wailing wall yet! It isn't time.

Tom Camphee

EDITOR-IN-CHIEF

Where the "HEATS ON Galvanite\*, works best."



What you see here is a bit of tomorrow. For although these neat, trim baseboard heating units have already found their way into thousands of homes, their future is even more promising.

Those manufacturers fabricating quality baseboard heating unity know that they must begin with quality steel. The manufacturer of this particular unit has had years of experience in making heating equipment. He wanted a steel that would resist rust and hold a finish — he wanted uniformity that would enable him to roll-form long, defect-free panels.

Galvanite\* conformed best to all these requirements. Galvanite\* is prime steel, hot dipped in zinc and precision wiped to just the right coating weight. This means the finest in rust protection. The special Galvanite\* surface is unsurpassed when it comes to holding paint fast for years. Galvanite\* is available in large coils to facilitate faster production.

If rust-resistance, tight finish and high production are factors in making your product — Galvanite\* is your material.

\*Trade name copyrighted by the Sharon Steel Corporation

### SHARON STEEL CORPORATION

Sharon, Pennsylvania



Type 430 Stainless and Galvanite\* Coated booklets are available from any Sharon office.

### DISTRICT SALES OFFICES

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letters from readers

### Warehouse Buying

Sir:

Your article titled "Warehouse Buying Economical" in your March 20 issue was one of the best presentations of this subject I have ever read. It certainly is thought-provoking.

Having profited materially from this article, we not only wanted to compliment you on it but also get your permission to reprint it.

Both officially and personally, thank you for providing us with a weekly service that is outstanding in every respect. W. G. Brayley, Sales Mgr., Samuel, Son & Co., Toronto.

### Ford First?

Sir:

We were very much interested in the article, "Will Lincoln Switch to Unitized Body?" that appeared in the March 29, 1956 issue of IRON AGE.

Our records show that the Lincoln Zephyr was the first automobile to use the unit-type construction and contain a brief description telling how the design and construction represent a Ford "first." G. K., Ford Motor Co., Detroit.

### **Welding Dollar**

Sir:

Please send me two copies of "How To Get More For Your Metal-working Dollar"—Welding including rod and electrode charts. Congratulations on this series and particularly on this issue. It is service such as this that makes THE IRON AGE of such high value to its readers. H. L. Sittler, Welding Eng., Air Reduction Sales Co., Chicago.

Copies are still available.-Ed.

### CO2 Core Curing

Sir:

Regarding the article Cure Cores with CO<sub>2</sub>—In Seconds, in the April 12 issue is it necessary to use sodium silicate, or may another silicate be used, like ethyl silicate, to get the chemical reaction?

Does the sodium give the reaction, or the silicate, in the mixture being cured? F. A. Hall, Chemical and Rubber Specialties, Syracuse.

The use of sodium silicate and its quality are highly significant. Since the sodium silicate breaks down to form colloidal silica gel and a carbonate, both sodium and silican are involved in the chemical reaction. Curing, however, results from the action of the silica gel and the carbonate is simply a harmless end product.—Ed.



Lincoln-Zephr Unit Body and Frame

The Value of

RELIABLE

DELIVERIES

BCElone.

PRODUCTION MGR., THE CINCINNATI GEAR CO.-

Any job involving a large amount of responsibility is exacting. While I do not claim that mine is the toughest, I can say that the rigid policy set down by our management requires constant diligence and effort.

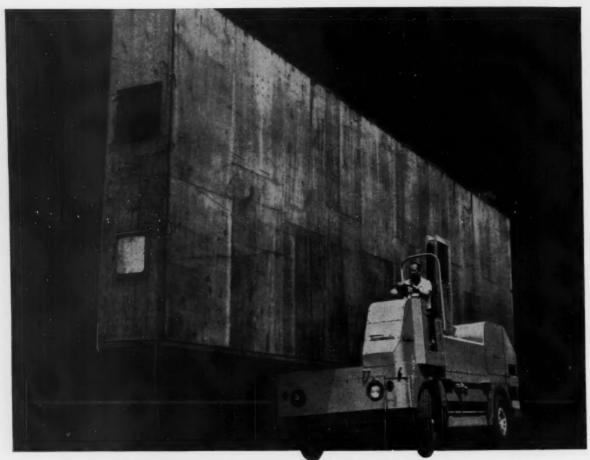
It is the policy of The Cincinnati Gear Company to make a delivery promise to the customer that there is every reason to expect will be fulfilled. The customer has a right to receive accurate information concerning the anticipated shipment of his order, and he also has a right to expect that promise to be fulfilled. It is the job of my department to operate our new production scheduling system in such a manner that accurate delivery promises can be given, and at the same time prevent the lead time from being ridiculously long. It is gratifying to state that we have failed to meet schedules only in a very limited number of instances, and many times have been successful in helping customers who, for some reason or another, found themselves in a real jam.

The management of The Cincinnati Gear Company has charged me with the responsibility for deliveries. I know there will be no compromise short of the best possible job, and I can assure you that the most meticulous planning is done to be certain that delivery promises will be met.

### THE CINCINNATI GEAR CO.

"Gears — Good Gears Only"





# Now BIG loads handled efficiently by ONE MAN with ONE machine

Baker Travelouder

The labor, time and money-saving role played by industrial trucks throughout industry has long been recognized. But until now, there were no available methods or equipment for satisfactorily applying them to extremely long, bulky or awkward loads. Now comes the Baker Traveloader, designed for just this purpose. The Traveloader is essentially a fork truck that lifts loads from the side. But that's not all. It also places the load securely on the truck

deck, where weight of load is distributed over two axles and six wheels. In this position, it can deliver the load any distance to its destination, over inside-the-plant aisles, improved or semi-improved roadways, or over highways at speeds up to 30 MPH. And it can load, unload or stack loads—regardless of their length—to a height of 12 feet, from aisles no wider than 10 feet. It is the only one machine that does all this with one operator!

Write for Descriptive Bulletin No. 1360

ONLY TRAVELOADER..



Picks up like a straddle truck



Delivers like a highway trud



Stacks like a fork true

See Baker Trucks in action at the MHI Show June 5-8.

THE BAKER-RAULANG COMPAN

1227 WEST 80th STREET . CLEVELAND 2, OHIO

handling equipment

Baker

A subsidiary of Otis Elevator Company

611

### fatigue cracks

### by William M. Coffey

### Thimk (Sic)

Unlike THINK, which you naturally associate with IBM and SMILE, which we think goes with Fuller Brush Co., here's one we haven't been able to identify. We suspect that no company will

PLAN AHEA

claim it for its official slogan. The copy we have is not otherwise identified but if anyone can shed any light on its origin we'll be mighty grateful.

Personally, we suspect that it's the work of the same crew that revised the two standard slogans to read THIMK and SNILE.

### Handling Dollar

Just so you don't miss it, we'll start off right now and tell you No. 4 in the "How To Get More For Your Metalworking Dollar" series will appear next week. This time it's on Material Handling and should put you right in the mood for the Material Handling Show in Cleveland, June 5-8.

The Material Handling Feature will give you cost-saving tips on the buying and use of industrial trucks, conveyors, pallets, automatic handling devices and other equipment you use to move things from one place to another.

This Special Feature will first take you through the fundamentals of choosing the right handling method, then get into specifics on each of the major handling categories. A few of these specifics include the pros and cons of various truck scheduling systems, efficient maintenance practice, automatic vs semiautomatic conveyors and savings on palletizing costs. A special section on material handling case histories will round out the pointers given in the Handling Feature.

For those attending the Material Handling Show we've also included a rundown of new handling equipment, technical program and speakers and companies who'll be represented.

#### Dollar letters

Reason we didn't want you to miss this feature in the series is that so many others aren't going to, if past performance is any judge. Remember the first two in the series on Stainless Steels and Tooling? Well, so far we've received over 900 individual letters about them asking for a total of about 8000 reprints. On the April 26 Welding Dollar feature we've already received about 200 letters and they're still coming in. We'll keep you posted.

#### **Puzzlers**

The May 5 puzzler posed by friends Fred v. Gienanth and Heiko Pacyna of Germany brought out three sterling stalwarts. Thomas E. Lewis, Jr., Douglas Aircraft Co., says the answer is 1.061a. J. C. Severn, The Toledo Pressed Steel Co., says "the maximum square bore thru this hexagon without touching the vertices

approaches — as a limit or

1.2247a. Fred and Heiko say a  $(\sqrt{6}-\sqrt{2})$ . Are all these the same?

### New Puzzler

A debt of \$1 million is retired in 25 years by making 15 annual payments of \$77,600 each followed by 10 annual payments of \$42,300. What is the interest rate?

# Alloy Strip in Precision Sizes meets New Design Needs...



From 0.0005 in. to 0.040 in. thick and 0.090 to 6 in. wide, these alloys are available as special-tolerance strip:

Beryllium Copper Phosphor Bronze Nickel Silver Brass Chromium Copper Stainless 17-7PH Invar Magnetic: High Nickel

Some immediately available. Others rolled to order in 2 to 21 days. Can be supplied in coils or straight lengths with slit or filed edges—also cadmium plated.

Write for Bulletin 7 TODAY.

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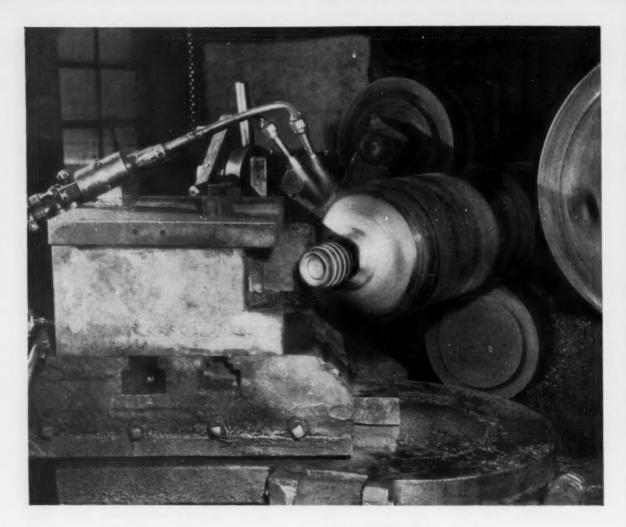
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## How to bottle up 2400 psi

The Marison Company of South Elgin, Ill., is a leading producer of industrial oxygen cylinders manufactured to hold this active gas at 2400 psi. From its beginning, Marison has consistently used Seamless Tubing for this task.

Marison has found B&W Seamless Tubing to be ideal for its complicated cycle of spinning, forming, heat-treating and threading operations. Every ounce and every inch of tubing—and every operation by Marison—must be flawless in every respect to meet the demands of these pressure cylinders.

Whatever your requirements in tubing...for consistently high and uniform quality...for top service ...look to B&W. For more information on selection

and use of carbon, alloy or stainless steel tubing, write for Bulletin 361 or call in Mr. Tubes, your nearby B&W Tube Representative. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels

# dates to remember

#### MAY

- AMERICAN SUPPLY & MACHINERY MANUFACTURERS ASSN.—Annual convention, May 20-23, Atlantic City, N. J. Society headquarters, 2130 Keith Bldg., Cleveland.
- NATIONAL ASSN, OF PURCHASING AGENTS — Convention, May 20-23, Cleveland Public Auditorium, Cleveland. Society headquarters, 9 Park Place, N. V.
- AMERICAN IRON AND STEEL INSTI-TUTE—60th general meeting, May 23-24, The Waldorf-Astoria, N. Y. Society headquarters, 350 Fifth Ave., N. Y.

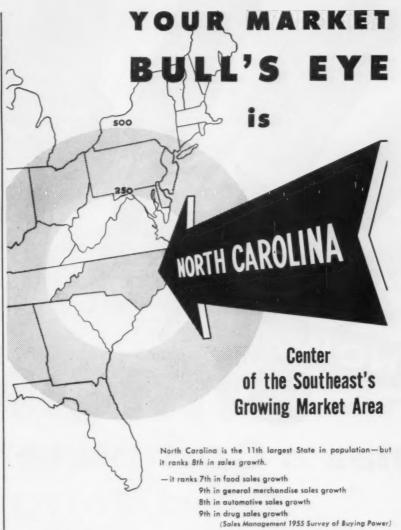
#### EXPOSITIONS

- MATERIALS HANDLING SHOW, June 5-8, Cleveland.
- THE SOCIETY OF THE PLASTICS IN-DUSTRY, INC., June 11-15, New York City.
- ASSN. OF IRON & STEEL ENGINEERS, Sept. 25-28, Cleveland.
- METAL SHOW-Oct. 8-12, Cleveland.
- WIRE REINFORCEMENT INSTITUTE

  --Annual spring meeting, May 28-30,
  The Greenbrier, White Sulphur Springs,
  W. Va. Society headquarters, National
  Press Bidg., Washington 4, D. C.
- CONCRETE REINFORCING STEEL IN-STITUTE—Annual meeting, May 28-June 2, The Greenbrier, White Sulphur Springs, W. Va. Institute headquarters, 39 S. Dearborn St., Chicago.
- STEEL JOIST INSTITUTE Annual meeting, May 29-30, The Greenbrier, White Sulphur Springs, W. Va. Society headquarters, Dupont Circle Bidg., 1346 Connecticut Ave., Washington, D. C.

#### JUNE

- AMERICAN GEAR MANUFACTURERS ASSN.—40th annual meeting, June 3-6, The Homestead, Hot Springs, Va. Society headquarters, Empire Bldg., Pittsburgh 22, Pa.
- SOCIETY OF AUTOMOTIVE ENGINEERS, INC.—Summer meeting, June 3-8, Chalfonte-Haddon Hall, Atlantic City, N. J. Society headquarters, 29 W. 39th St., N. Y.
- AMERICAN SOCIETY OF CIVIL ENGINEERS—National spring convention, June 4-8, Knoxville, Tenn. Society headquarters, 33 W. 39th St., N. Y.
- SOCIETY FOR ADVANCEMENT OF MANAGEMENT—Small business conference, June 7-8, Hotel Statler, N. Y. Society headquarters, 74 Fifth Ave., N. Y.
- THE NATIONAL ASSN. OF METAL FINISHERS Annual meeting and fifth management seminar, June 17-18, Mayflower Hotel, Washington, D. C. Society headquarters, 35 E. Wacker Dr., Chicago.



Since 1945 North Carolina retail sales have increased 15% more than the national average.

This kind of progress is important to any long-range planning for your new plant in North Carolina. North Carolina is still a state of small farms and small towns...all connected by a vast network of good roads accessible to trunk highways, North-South and East-West.

This physical background is ideal for component parts of manufacturing in electronics and metalworking—for "hush-hush" development and production—and for farm produce and seafood processing. The growing local and southeastern market is at your doorstep, and more than half the nation's population is within overnight reach.

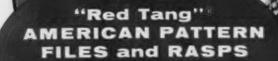
### FREE BROCHURE

"Industrial Location Factors" — Send for a copy today. Department of

CONSERVATION AND DEVELOPMENT Raleigh II, North Carolina

William P. Saunders, Director

NORTH CAROLINA
YEAR 'ROUND MID-SOUTH



For general or special purpose machine shop filling saw sharpening; and for use an wood, leather and soft metals.

# SINONDS has a Complete Line of "Red Tang" Files!

Simonds now offers you all types of files in the Right Length, the Right Shape and the Right Cut for every filing job. What's more, Simonds Files are Grade A, First Quality only . . . backed by Simonds reputation for outstanding quality, dependability and service.

## SIMONDS SAW AND STEEL CO.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon Canadian Factory in Montreol, Que. Simonds Divisions: Simonds Sheel Mill, Lockport, N. Y. Heller Tool Co., Newcomerstown, Ohio Simonds Abraive Co., Philar, Po., and Arvide, Que., Canada

> For Fast Service from Complete Stocks



### ROTARY FILES

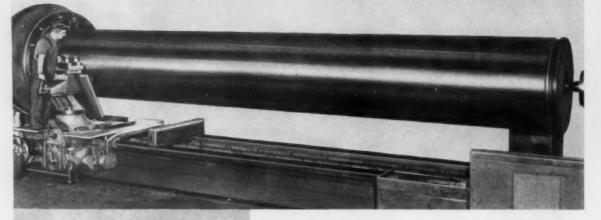
for power driven filing in tool and die shops, patte shops, aircraft and automotive plants, machine shops, foundries: American-Swiss
SWISS PATTERN
FILES

For precision work where the craftsman's delicate touch is a matter of pride and profit

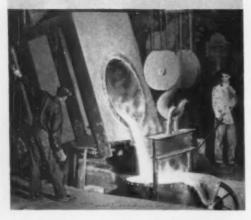
VIXEN®
Milled Curved-Tooth
FILES

For fast, smooth work on lead, balblitt, eins, bluminum, bronze, plastics, cast from and steels over where

### world's largest stainless steel centrifugal casting



SANDUSKY
... melted in
AJAX Furnaces



Here, at Sandusky Foundry and Machine Co., is Ajax induction melting at its best. Here . . . where furnaces of up to 5 tons capacity melt metal for centrifugal castings weighing up to 20 tons . . . Ajax Northrup induction equipment has simplified techniques, improved casting quality and permitted a cleaner, more efficient shop.

The Sandusky installation typifies a melting technology that has revolutionized foundry procedures . . . casting parts of accurate analysis faster and with less waste. Sandusky also represents extreme flexibility of induction melting. Two motor-generator sets permit complete freedom of choice when selecting melting facilities for a particular job.

These advantages of Ajax-Northrup induction melting equipment can be realized in your foundry . . . whether ferrous, non-ferrous, or both. Write Ajax Electrothermic Corp., Trenton 5, New Jersey, for additional details in Bulletin 27-B.

Associated Companies: Ajax Electric Company-Ajax Electric Furnace Co.-Ajax Engineering Corp.





FOR COMPLEX FABRICATION. In chemical plants, these Stainless Steel acid catchers are used to remove dilute sulfuric acid from gases. Continental Boiler & Sheet Iron Works in St. Louis fabricated the units. Notice the complicated curves in the helix plates, and the neat joinery . . . a tribute to fine craftsmanship and the workability of Stainless Steel.



FOR ABRASION AND CORROSION RESISTANCE. Oil can racks stand out in all kinds of weather, and the support strips are constantly rubbed and knocked by the heavy cans of oil. Modern Metal Products Company of Greensboro, N. C. makes the strips out of Stainless Steel so they will stay bright and new-looking, and never get banged out of shape.

# NOTHING can equal Stainless Steel

In its combination of desirable properties

No other design material can match Stainless Steel in its combination of desirable properties: corrosion resistance, strength and hardness, beauty, cleanability and easy fabrication. When seeking a source of supply, remember that United States Steel offers you the widest range of types, finishes and sizes.



FOR SANITATION. These Stainless Steel shelves are made by the Eastern Steel Rack Company, Boston, Massachusetts, for use in cold storage rooms. They are easy to clean, and offer a sanitary, corrosion-resistant surface for food products of all kinds.

UNITED STATES STEEL COMPONATION. PITTSBURGH - AMERICAN STEEL & WIRE DIVISION, CLEVELAND COLUMBIA-GEREYA STEEL DIVISION, SAM FRANCISCO - NATIONAL TUBE DIVISION, PITTSBUNGH TERMESSEE COAL & HOND DIVISION, FAMFIELD, ALA.

UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

### USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS



UNITED STATES STEEL

# "It was a ticklish job — shrink-fitting the world's largest plate mill roll"

says Harry Brinker, Asst. Division Supt.,

Homestead Forgings Division

Although he has spent over 40 years in the forge shop, even Harry Brinker was impressed with, and proud of the arbor sleeve back-up roll shown here. It is being shipped to Ruhrstahl AG., a large German basic steel producer.

The arbor is about 29 feet long and 4 feet in diameter. It is a USS Quality Forging, heat treated and machined. Encasing this arbor is the roll body, a sleeve about 13 feet long and 6 feet in diameter. This also is a USS Quality Forging, heat treated and machined. The complete roll weighs 121 tons.

The steel is nickel-chromium-molybdenum-vanadium alloy, heat treated to 52 Shore for the arbor, and 60 Shore for the sleeve. But the tough part of this job was the shrink fit. Both pieces had to be machined with great care. Then the outer piece was heated and slipped over the arbor, using carefully developed techniques to position it exactly before it cooled and shrank to form an inseparable bond with the inner piece. In fact, it was U. S. Steel's unique experience with this type of fabrication that led Ruhrstahl to come 4,000 miles for this roll—the largest of its type ever produced.

USS Quality Forgings are discussed in a booklet that is free upon request. Please address inquiries or requests for the booklet to United States Steel Corporation, Room 5355, 525 William Penn Place, Pittsburgh 30, Pa.

### USS QUALITY FORGINGS



heavy machinery parts . . . carbon, alloy, stainless

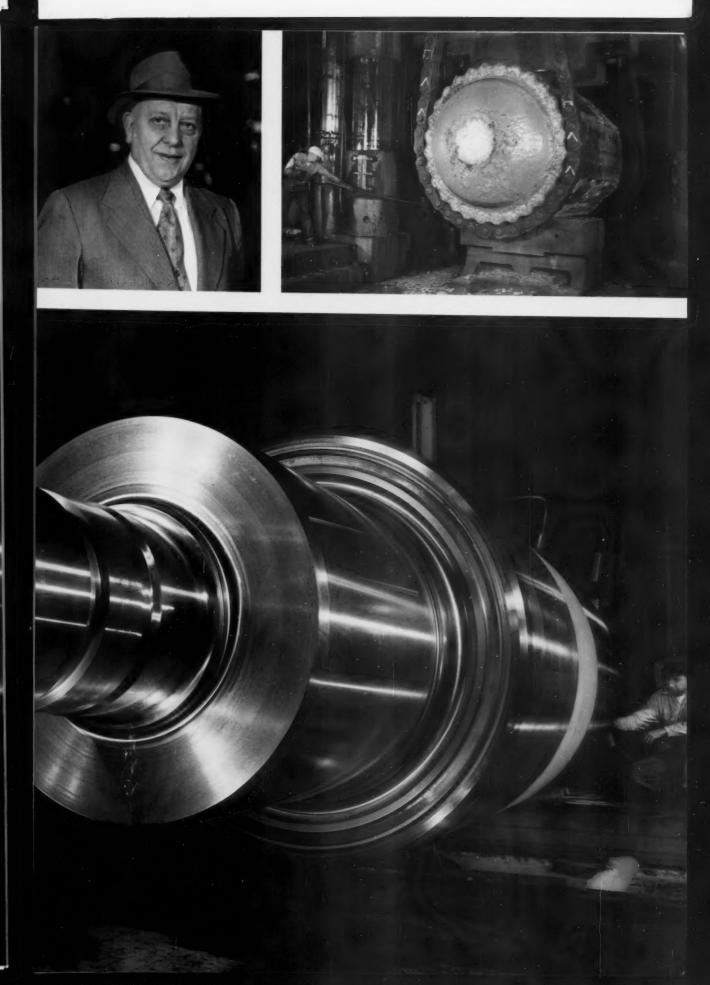
forged steel rolls and back-up roll sleeves

electrical and water wheel shafts

specialty forgings of all types

UNITED STATES STEEL







REFRACTORY CONCRETE lining in this large furnace is made with Lumnite cement. Furnace manufacturers - Champion Blower & Forge Co., Lancaster, Pa.

### Tough test for Refractory Concrete

Forge furnaces are tough on refractories because of the extreme variations in temperature and thermal shock due to rapid heating and cooling. Experience has shown that Refractory Concrete made with Lumnite\* cement gives excellent service in forge furnaces—also in other furnaces of many types, both large and small. Refractory Concrete has demonstrated its durability under severe temperature and service conditions. With it you can easily place your own refractory installations, and service strength is reached within 24 hours. A convenient way to make Refractory

Concrete is with castables. These are packaged mixes of Lumnite calcium-aluminate cement and selected aggregates designed for your specific job, prepared and distributed by leading manufacturers of refractories.

### UNIVERSAL ATLAS CEMENT COMPANY

UNITED STATES STEEL (S) CORPORATION SUBSIDIARY

100 PARK AVENUE, NEW YORK 17, N. Y.

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\*"LUMNITE" is the registered trade-mark of the calcium-aluminate cement manufactured by Universal Atlas Cement Company.

Atlas Lumnite Cement

FOR INDUSTRIAL CONCRETES
REFRACTORY - INSULATING - OVERNIGHT - CORROSION-RESISTANT



### **SKF®** Has Them All

If you want to be *sure* you are putting the right bearing in the right place in your product, check with MESF—the *one* bearing manufacturer selling all four major types of anti-friction bearings. From this single source, you quickly and easily get unbiased advice based on the broadest experience in the anti-friction field. **SKF** INDUSTRIES, INC., PHILADELPHIA 32, PA.

SKF

Ball Bearings 🔾 Cylindrical Roller Bearings ⊏

Spherical Roller Bearings Tyson Tapered Roller Bearings

### WIN a 2-weeks LUXURY

All Expenses Paid,



# ENTER JONES & LAMSON'S NEW HORIZONS

### **Grand Prize:**

Two-Weeks Luxury Vacation Trip for Two, All Expenses Paid, to a choice of one of the following: Paris, Hawaii, The Caribbean, The Canadian Rockies, Plus \$400 for spending money, baby sitter fee, etc. Two 2nd Prizes: Each a Seven-Day All-Expenses-Paid Luxury Vacation for Two to Bermuda. Plus \$200 spending money.

Three 3rd Prizes: Each a Shopmaster Combination Saw-Jointer Power Tool, complete with motor.

Ten 4th Prizes: Each a Shopmaster Individual Single-Purpose Power Tool (A Choice of Saw, Drill Press, Jointer, etc.)

Jones & Lamson, famed for opening up NEW HORIZONS in metalworking efficiency, now offers you, personally, NEW HORIZONS — a luxury vacation for two people for two weeks with all expenses paid, to your choice of Paris, Hawaii, The Caribbean or The Canadian Rockies.

Think of it — you can enjoy deluxe travel, finest hotels and accommodations, the very best of everything, plus \$400 spending money. Live like a millionaire for two weeks, for just answering this question, "Which Jones & Lamson machine, or machine feature, could, or does, help you most, and Why?"

When you write in (use coupon or not, as you wish), we will send you an official entry form, together with information upon which to base your answer. So don't delay! Even if you've never entered any contest before . . . if you have a good idea and can express it clearly — YOU may win this glorious luxury vacation for two!

And don't forget — there are other prizes! — two deluxe 7-day all-expenses-paid vacations for two to Bermuda, and 13 prizes of famous Shopmaster home workshop Power Tools! Enter today!

Read the simple rules, and send in this coupon NOW!



JONES & LAMSON MACHINE COMPANY

511 CLINTON STREET, SPRINGFIELD, VERMONT

### **VACATION FOR TWO!**

to your choice of ...



### CONTEST TODAY!

#### CONTEST RULES

Contest is open to all persons, residing in the continental U. S. A., engaged in metalworking or allied industries, except employees of Jones & Lamson Machine Company, its selling agents and its advertising agency, and members of their families.

Contestants merely answer, in 150 words or less, the question "Which Jones & Lamson Machine, or Machine Feature, could, or does, help you most, and Why?"

Entries are to be mailed to Jones & Lamson NEW HORIZONS CONTEST, Box 364, Back Bay Annex, Boston 17, Massachusetts.

Entry must be contestant's own, and must be handprinted or typed on an official Jones & Lamson NEW HORIZONS CONTEST entry form. Entry forms that are not completely filled out will be disqualified. Entry forms filled out in handwriting will also be disqualified. No entries will be returned, and all entries become the property of — Jones & Lamson Machine Company. The submitting of a contest entry implies the contestant's agreement with and submission to all contest rules. Contest entries must be postmarked by midnight July 10, 1956 and received by July 20, 1956.

Board of Judges will include machine tool engineers, production foremen, business executives, trade publication editors, and an engineering college faculty member.

Judges' decisions are final. Entries will be judged for aptness of thought, originality and sincerity. "Literary style", as such, will *not* be a deciding factor. Elaborate or "fancy" entries will receive no extra consideration.

Winners will be announced in Jones & Lamson Machine Company advertisements in trade publications as soon as possible after the judging of the contest.

### JONES & LAMSON MACHINE COMPANY

511 Clinton Street, Springfield, Vermont

Please send official NEW HORIZONS CONTEST entry form and information to:

Name\_\_\_\_\_\_Address\_\_\_\_\_

ity\_\_\_\_\_\_Zone\_\_\_State\_\_\_\_

Easy to Enter! Win!



# **MASTERS** and PADS

for BETTER PERFORMANCE and BETTER PRODUCTION

### STYLE "S" SURE-GRIP DRAW-IN MASTER COLLETS and PADS

Cleveland

Cone

Greenlee

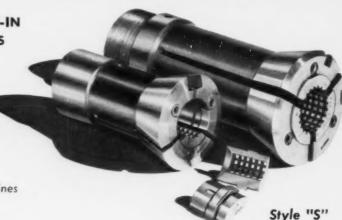
Gridley and Acme-Gridley

National Acme

New Britain

Warner & Swasey

Available for all sizes of above machines up to and including  $3\frac{1}{2}$ " capacity.



The Only Master Collet With No Work Pressure

---

### STYLE "B"

### MASTER FEED FINGERS and PADS

Brown & Sharpe

Cleveland

Cone

Davenport

Greenlee

Gridley and Acme-Gridley

National Acme

New Britain

Warner & Swasey

Available for all sizes of above machines up to and including  $3\frac{1}{2}$  capacity.



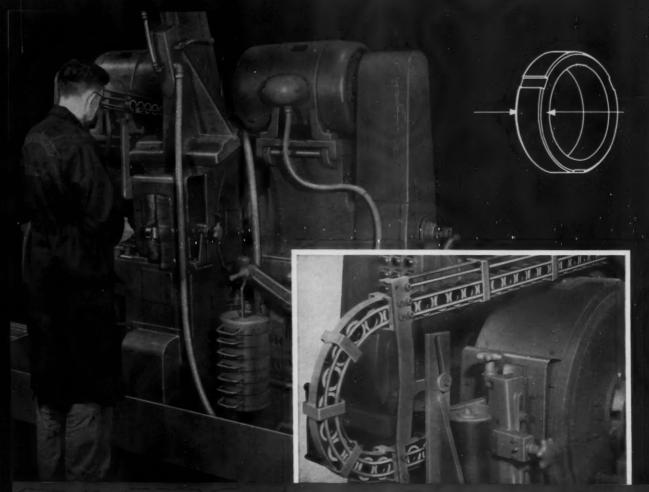
Pads Cannot Work Loose No Screws — No Pins

Ask for Style "S" and Style "B" Bulletins which give all performance features, price savings, and ordering information

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"

immediate stock delivery from Elmira, Dayton, Chicago, Minneapolis, St. Louis, Defroit, San Francisco, Los Angeles, Philadelphia, Hartford, New York



# Grinds 3600 Clutch Race Faces per Hour

#### Job Data

MACHINE

Gardner Precision Double Spindle Grinder.

PRODUCTION

1800 per hour, both faces.

STOCK REMOVAL

.030" overall.

TOLERANCES

.0002"-.0003" for parallelism; .0005" for uniformity.

ABRASIVES

2 Gardner YELLOW-RIM WIRE-LOKT® Discs.

Production and accuracy increased by grinding TWO parallel faces in ONE operation

Heat-treated steel outer clutch race for automatic transmission.

Operator inspects work

GARDNER

precision disc grinders
BELOIT, WISCONSIN

### expanding mill standardizes on



To meet ever-increasing demands for specialized steel, an eastern mill has completed an extensive expansion program consisting of a new reversing cold mill and two auxiliary lines. Significantly, Allis-Chalmers control is utilized in all three operations.

Progressive mills are taking advantage of Allis-Chalmers experience in engineering, building and applying steel mill control — control that provides smooth, precision performance — control that affords maximum production and top quality with a minimum of outage time and maintenance. Get all the facts about Allis-Chalmers mill control. See your A-C representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.





The Allis-Chalmers control on this line provides an exceptionally wide speed range of more than 15 to 1. Power for the line comes from three separate m-g sets employing magnetic amplifiers for quick response. Complete synchronization between entry, processing and delivery sections permits continuous mill operation.



ANNEALING LINE

This control features power-type magnetic amplifier regulation for accurate control and low maintenance. Variable voltage power is obtained from a six-machine m-g set. Speed regulation of .5% assures constant strip speed and a resulting uniformity of high quality steel. Opentype control boards utilize Allis-Chalmers components especially designed for mill operation.



**ALLIS-**

**ALLIS-CHALMERS** 



### REVERSING MILL

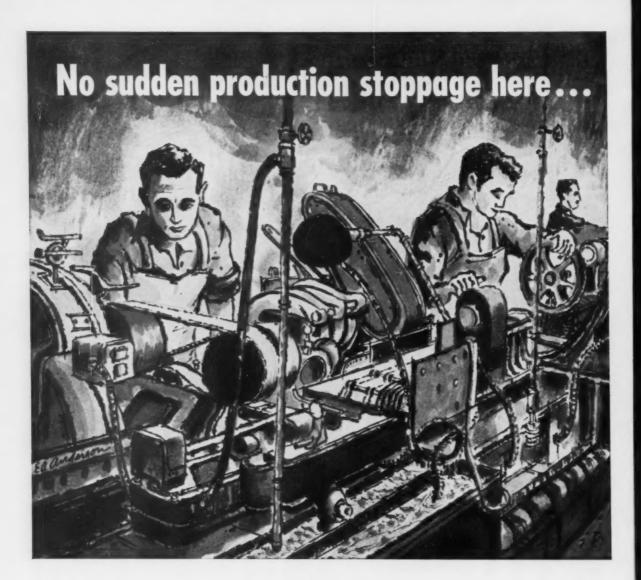
Critical percentage reduction of specialized steels rolled with this mill requires exacting control. Main mill voltage and reel tension circuits utilize new high-gain magnetic amplifier control. Because the magnetic amplifier is a static device, maintenance and necessity of replacement parts are reduced to a minimum. Fast arc-centering blowout on the dc contactors, shown on the control board, extends contact and chute life. Exceptional interchangeability of contactor and relay parts affords maximum convenience and economy.



CHALMERS

May 17, 1956

19



the truck that never lets you down is ELECTRIC

Electric trucks reduce the hazard of sudden breakdown to the absolute minimum. Consequently, the more continuous the operation the more electrics win out in cost per unit of work. Use the ideal combination . . . electric trucks powered with Edison batteries.



because no sudden failure here



### an EDISON battery won't let you down

Split-second timing of modern production lines requires fast, sure efficient delivery and removal of material. That's why so many companies rely on industrial trucks powered with dependable Edison batteries to keep production lines moving continuously at top speed... and eliminate risk of sudden failure.

Edison batteries with their more rugged steel cell construction withstand abnormal working conditions. And their foolproof electrical characteristics give an extra measure of dependability that no other batteries can match.

Economy is another important advantage of Edison-powered trucks. Cost studies reveal substantial savings when industrial trucks are powered with long-lasting Edisons.

In addition, Edison batteries can be charged faster, operate with full efficiency in extreme temperatures, and require less maintenance. And Edison's follow-up service policy assures you of top performance, year after year. Thomas A. Edison studied thousands of chemical combinations before developing this most efficient method of utilizing quiet, clean, smooth, low-cost electricity for motive power for industrial trucks.

Today there's an Edison battery for your material-handling needs...from small "walkies" to big ram trucks. Ask your local Edison field engineer to help you choose the one best for you. Or write Edison Storage Battery Division, Thomas A. Edison, Incorporated, West Orange, N. J.

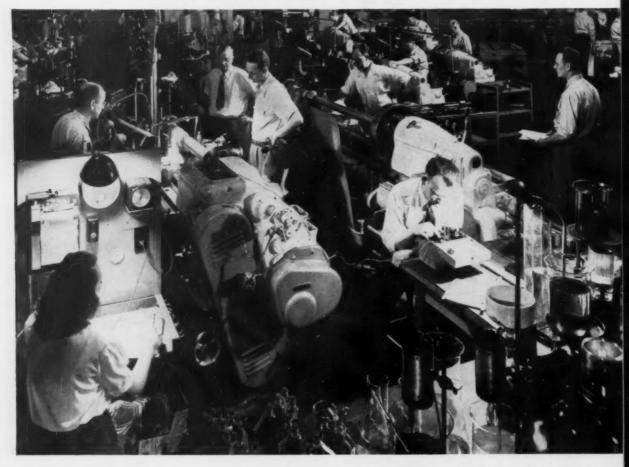
You get more dependable power-lower over-all cost with

EDISON

NICKEL-IRON-ALKALINE
STORAGE BATTERIES



# Pour savings with GULFCUT



Here is a part of the modern machine shop in Gulf's extensive laboratories at Harmarville, Pa., where Gulfcut cutting oils are thoroughly tested and proved in actual shop service.

THE FINEST PETROLEUM PRODUCTS FOR ALL YOUR NEEDS

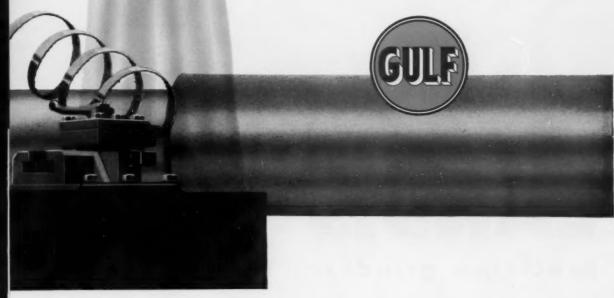
# into your shop CUTTING OILS

Gulfcut is the new brand name for Gulf's complete line of modern, up-to-date cutting fluids. Each Gulfcut oil is scientifically compounded to meet the most exacting requirements for tool life, accuracy of work, and surface finish.

This new line of Gulfcut oils includes mineral-lard oils, sulfurized-mineral oils, sulfurized-mineral lard oils, sulfochlorinated-lard oils, and emulsifying oils—outstanding cutting oils that contribute to better results in every metal cutting operation.

Have a Gulf Sales Engineer show you how one or more of the Gulfcut line of cutting oils can help you get increased tool life and lower machining costs in your shop. Consult the telephone directory for the number of your local Gulf office.

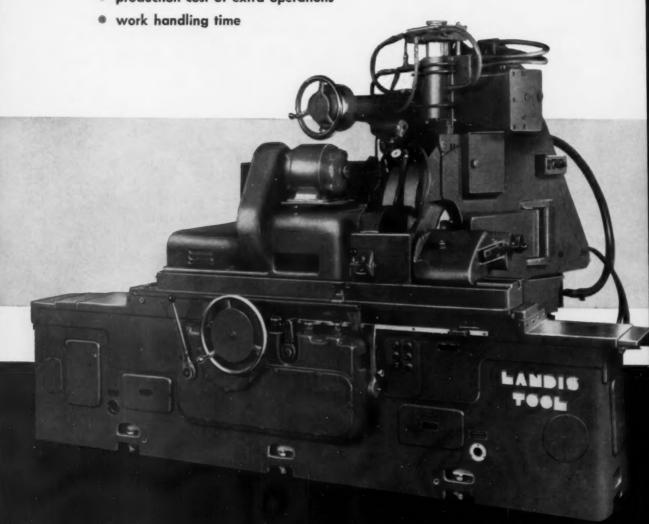
Gulf Oil Corporation • Gulf Refining Company
1822 Gulf Building, Pittsburgh 30, Pa.



# **How to Cut Grinding Costs**

### This Landis engineered method saves:

- investment in an additional machine
- production cost of extra operations

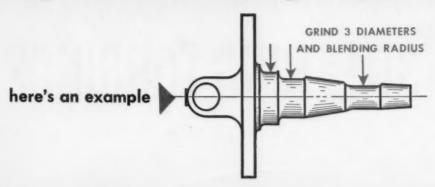


Landis 10" x 36" Type CH Plain Grinder with wheelbase set at 30°. Overhead, hydraulically operated profile dresser.

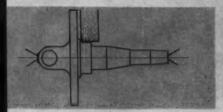
# LANDIS

precision grinders

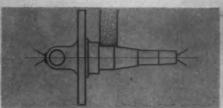
# by Combining Operations



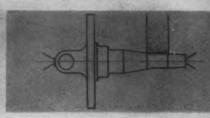
### old fashioned method-3 operations



operation No. 1



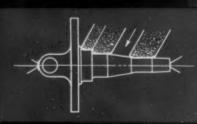
operation No. 2



operation No. 3

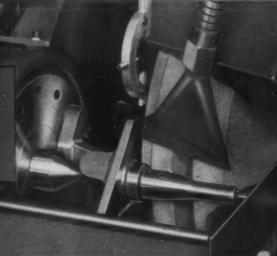
### modern method

Landis angle wheelbase grinding



only 1 operation!

Three Diameters and Three Blending Radii of front wheel spindles are ground in one operation. Grinding is performed with spaced wheels on a wheelbase set at 30° angle. Stock removal is .015" on diameter and .009" on faces. Limits are .0005" on diameter and .010" on radius.



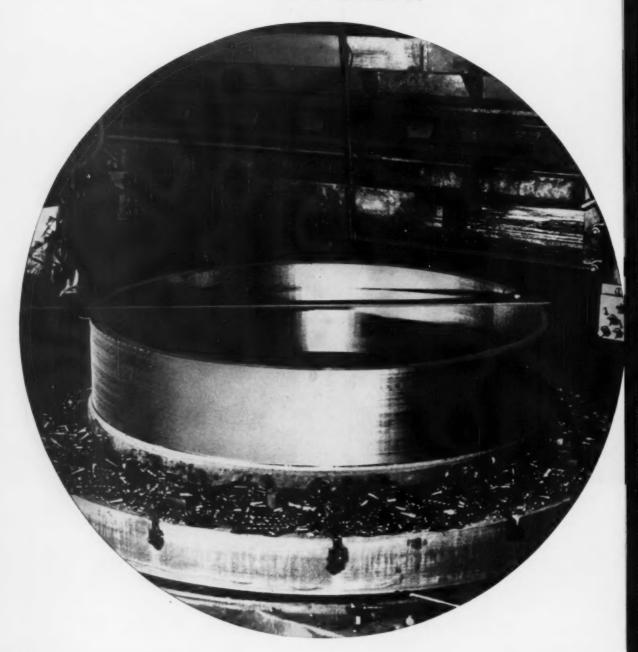
LANDIS TOOL COMPANY

WAYNESBORO, PENNA.

3 Basic Reasons Why

# ALCO STEEL RING FORGINGS

are Better



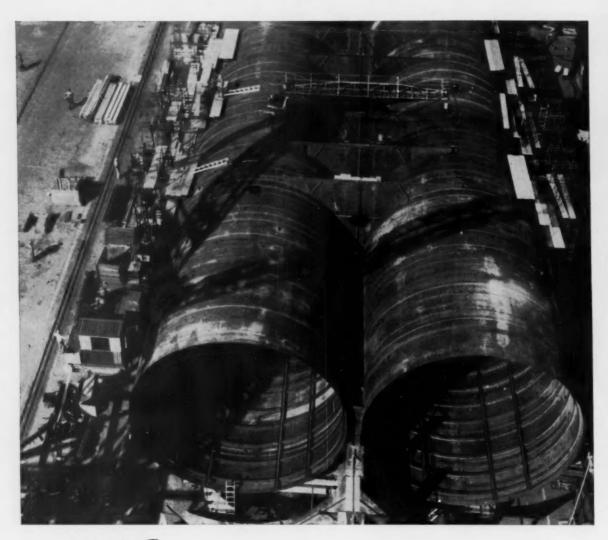


finishing, the very latest in precision equipment and production techniques are utilized. In the rolling operation, for example, hundreds of different rolls are employed for shaping outer and inner contours. ALCO machinists can produce either rough rings or rings machined to the most exacting tolerances and finish requirements.

Throughout the entire manufacturing process, many types of mechanical and electronic testing devices are available for checking specific properties. These include tests for hardness, grain size, microstructure, nonmetallics, jominy, fatigue, impact, bend, corrosion, creep and inner soundness. You are assured of consistent quality in your finished products.

We invite you to talk with your nearby Alco representative to learn for yourself how Alco ring forgings can be profitably incorporated in your product. Contact him today, or for more information send for our illustrated brochure. Sizes range from 18" OD to 145" OD.

ALCO PART TO !	SALES OFFICES IN: Atlanta, Beaumont, Chicago, Cleveland, Houston, Kansas City, Los Angeles, New York, Pittsburgh, St. Louis, St. Paul, San Francisco, Schenectady, Tulsa, Washington
1.6	
STATES (BASE)	ALCO Products, Inc. P.O. Box 1065 Schenectady 1, N. Y.
	☐ Please send your 16-page brochure on Seamless Forged and Rolled Products.
	Please have representative call.
	NAME
Miller Co.	COMPANY
	STREET
	CITYZONESTATE



# GAS HELPS MARYLAND SHIPBUILDING SHAPE FRAMES FOR NEW HARBOR TUNNEL



A huge Gas-fired furnace at Maryland Shipbuilding and Drydock Company, Baltimore, Maryland proved its advantages when that company was awarded a construction contract for part of Baltimore's vast new \$140,000,000 Harbor tunnel project.

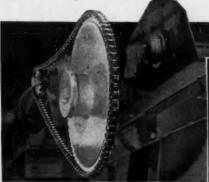
When Maryland Shipbuilding and Drydock Company installed their two new furnaces—for heating plates and angles—it was decided to use Gas, based on its superior temperature control, lower maintenance, and higher output due to faster heating-up

and less loss of time in changing operating temperatures.

The Gas-fired furnace is now heating 26'6" long T-bars that are shaped and welded, in sets of four, to form 35' circular frames used in the tubular sections of the Harbor tunnel.

For information on how Gas can help you in your production operations, call your Gas Company industrial specialist. He'll be glad to discuss with you the economies and outstanding results you get with Gas and modern Gas-fired industrial equipment. American Gas Association.

It's not just static strength...



RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined side bars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist operational stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength plus special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing.

# dynamic strength in LINK-BELT Roller Chain that fights fatigue

N high-speed drives or heavy conveying jobs, the components of every pitch of roller chain face severe and repeated operating stresses—engagement with sprockets, shock of starting loads, centrifugal loads and others. That's why dynamic strength—ability of chain to resist these stresses—is so important. And it's built into every length of Link-Belt Precision Steel Roller Chain.

How is dynamic strength developed? In addition to Link-Belt "extras"... special design, manufacturing and processing steps provide required properties of uniformity and accuracy for long-life operation.

Talk over your roller chain needs at your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Book 2457, covering this complete line of single and multiple widths, in ½ to 3-inch standard pitch, 1 to 3-inch double pitch.



**ROLLER CHAINS & SPROCKETS** 

LINK-BELT gives you dynamic strength that comes from these important EXTRAS

PRE-STRESSING of multiple width chain provides uniform load distribution.





SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL—coupled with rigid testing insures uniformity.





LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

# The PROOF of the STEEL is in its PERFORMANCE

DSC STRIP PERFORMANCE SCORE - 99.956%

on appliance hardware components · for 14 consecutive months January '55 through February '56

We have the customer's permission to cite this actual experience-

#### THE FACTS

This DSC customer makes a quality line of appliance hardware components. His gauges run from about .040 inch to about 1/2 inch (some with restricted tolerance) . . . in various widths . . . tempers 1, 2, 3 and 4. We supply DSC No. 2 regular bright finish for chrome plating.

#### THE RECORD

Of the total tonnage of DSC STRIP shipped to this customer during the period stated. 99.956% met all requirements. Rejections for all reasons-gauge, size, temper, finish, etc.averaged less than 431/2 pounds per 100,000 pounds.

On the same basis, the overall performance of DSC STRIP on total shipments to all customers during 1955 averaged 99.354%.

Strip, Sheet, Rod or Wire-DSC STEELMANSHIP is the same.

How about putting a job of yours up to a DSC Customer "Rep" . . . today?

Customer Satisfaction Is Our No. 1 Job



# EEL CORPORATION

GENERAL SALES OFFICE, DETROIT 9, MICHIGAN

Charlotte, N. C., Chicago, Cincinnati, Calumbus, O., Dayton, O., Detroit, Grand Rapids, Mich., Hamden (New Haven), Conn., Indianapolis, Jackson, Mich., Louisville, Ky., New York, St. Louis, Toledo, Worcester, Mass.

MILLS PORTSMOUTH, OHIO (Sheets, Rods, Wire)
DETROIT, MICH. and HAMDEN, CONN. (C.R. Strip)

Hot Rolled and Cold Rolled Sheets Cold Rolled Carbon Steel Strip • Flat Cold Rolled Carbon Spring Steel Low and Med. Carbon Manufacturers' Wire • High Carbon Specialty Wire Aluminum Cable Strand Reinforcement • Rope Wire • Tire Bead Wire Welded Wire Fabric

### RELIANCE EXPRESS SERVICE

ON READY-TO-USE Job-Fitted SHEET AND STRIP

COLD ROLLED STEEL STRIP: Coils • Cut Lengths • All tempers SHEETS: Cold Rolled . Hot Rolled . H.R. Pickled . Galvanized . Long Terne

Experience-Fitted to Your Job



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RELIANCE DIV. DETROIT STEEL CORPORATION

General Office: Detroit 9, Mich.

PLANTS

SALES OFFICES: Dayton, O., Cedar Rapids, Ia., Des Moines, Ia., Grand Rapids, Mich., Indianapolis, Ind., Jackson, Mich., Milwaukee, Wis., New York, N.Y., Rochester, N.Y., Rock Island, Ill., St. Louis, Mo., Toledo, O., Worcester, Mass.

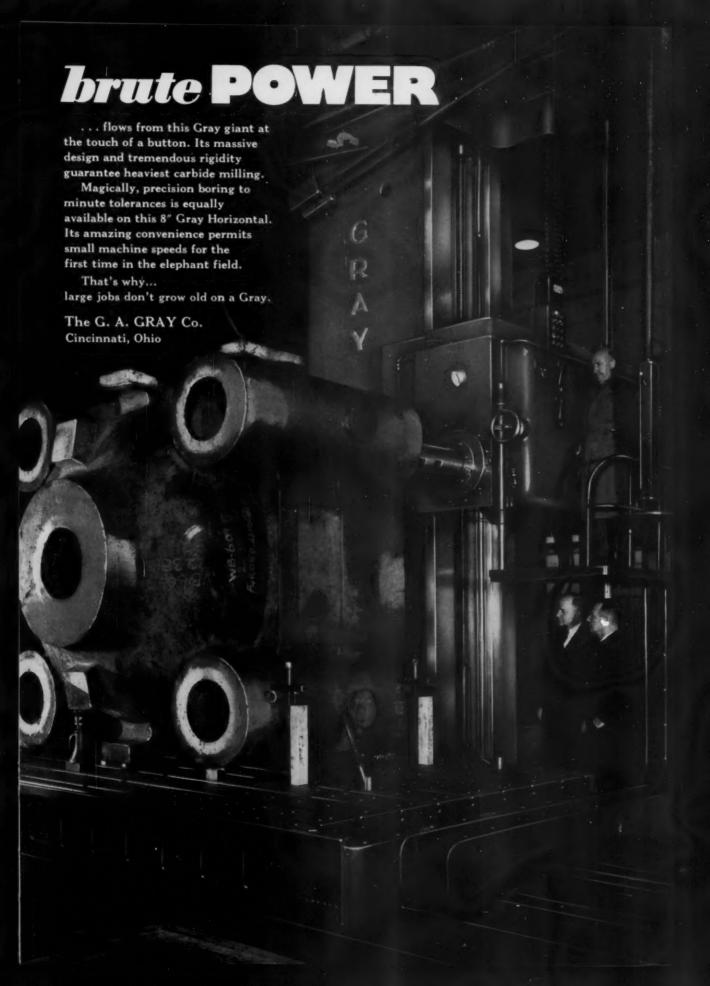
For DESIGN ENGINEERS and STAMPERS

WIN \$500 for the best re-design of a part now made as a stamping, formerly made by other methods.

ENTER FOR THE 1957 PMI-JOHN WOODMAN HIGGINS RE-DESIGN AWARD WRITE: PRESSED METAL INSTITUTE, 3673 Lee Road, Cleveland 20, Ohio



Adv. Courtesy DSC



# For your new factory ... or addition



# Which locking system do you prefer?

### Republic Steel Lockers offer three types

Combination...padlock...or key operated ...Republic has 'em all—including Key-Control.

And you can have your choice of these protective systems in any one of many types and sizes of standard steel lockers for every conceivable storage requirement.

Through more than 65 years, Republic's Berger® Division, the world's biggest manufacturer of lockers, has completed more installations than any other maker. Here is expe-

rience you can always depend on when you want the best in lockers.

Berger offers business and industry a complete planning and installation service, too. A service which supplies technical planning and engineering assistance, then assumes full responsibility for proper installation—right down to the final bolt. Get all the facts from your Berger representative, or send coupon for booklet giving details, specifications and prices.

# REPUBLIC



World's Widest Range of Standard Steels



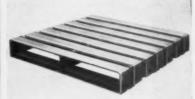




### These Republic products can be an important part of your operation



PALLET RACKS permit convenient storage of bulky, irregular materials that are normally unstackable. Odd lots are stored with space-saving economy. Simply palletize them all, and load pallets on rack. The rack, not the load, bears all the weight. Two-way entry permits loading and unloading from either side. Republic Pallet Racks, shipped knocked down, are easy to assemble. Sizes are available to fit your standard pallets.



STEEL PALLETS, made at Republic's Pressed Steel Division, are designed to eliminate the nuisance and expense of repairing broken deck boards, protruding nails, split stringers and joint failures. They're strong, rigid, have no sharp edges or projections to damage containers or workmen. Republic Engineers will help you develop a design that meets your specific requirements. Send coupon for literature,



wide-Lock STEL SHELVING, the world's strongest, is designed to gain strength as the load increases, thus permitting higher stacking without distortion or instability. Another product of Republic's Berger Division, Republic Wedge-Lock permits efficient use of overhead space. Wedge-Lock is easy to assemble; and later rearrange to suit changing needs. Mail coupon below for additional information on complete shelving line.

# STEEL

and Steel Products

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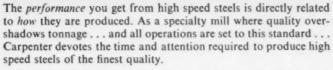


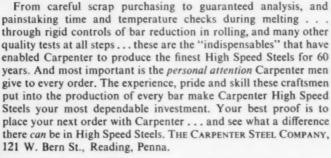




# How Men and Controls Protect Industry's Confidence in *Carpenter* High Speed Steels









# Every Order of *Carpenter* High Speed Steels Undergoes These and Many Other Quality Controls

- All scrap must be of purest quality, guaranteed analyses.
- Small, electric furnace melting units are used to control quality and uniformity to the highest degree.
- Every heat of steel is constantly checked for chemistry, temperature and melting time.
- Preheat and high heat furnaces are guarded for accurate time and temperature to prepare the steel for rolling.
- Percentage of reduction in cogging billets for rolling or forging of bars is skillfully controlled to assure freedom from internal stresses.
- Discs cut from each bar are acid etched, examined, hardened and fractured to certify internal cleanness, soundness, freedom from excessive segregation. And the hot acid etch is backed by Ultrasonic Testing.
- Slugs are cut from each lot of billets and machined in "step-down" fashion to guard against internal seams, shadow lines, etc.
- Extensive laboratory tests are made for proper hardness, micro-structure, grain size.
- Turning tests are run regularly to check cutting efficiency.
- For best results, put your confidence in . . .





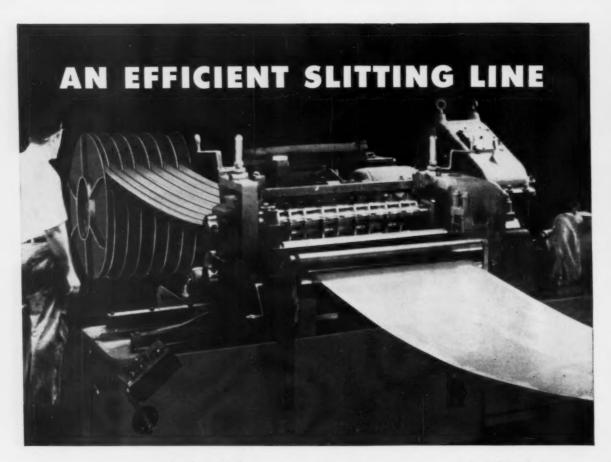












# ...with big savings possibilities



The Yoder Slitter Book contains time studies, production records, and other valuable data on the economics as well as mechanics of slitter operation. A copy is yours for the asking; also estimates and recommendations.

The standardized series of Yoder Uncoilers, Slitters and Recoilers make possible an infinite number of combinations for highly efficient coil and sheet slitting.

At a substantial saving in first cost, one of these combinations will meet widely varying production needs of fabricating shops as efficiently as higher priced, built-to-order equipment (also designed and built by Yoder) for very big tonnage requirements.

A Yoder standardized slitting line is a most profitable production tool which will pay for itself in short order on strip requirements as low as 100 tons per month, even less. Equally important is the ability in a few hours to meet expected and unexpected needs for slit strands, from a relatively small stock of standard width coils. This greatly reduces strip inventories and simplifies production planning.

THE YODER COMPANY • 5510 Walworth Avenue, Cleveland 2, Ohio



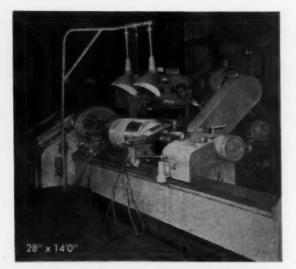
ROTARY SLITTING LINES

COLD ROLL FORMING MACHINES ELECTRIC-WELD PIPE AND TUBE MILLS



# They have taken the GRIND".

# at the Aliquippa works of J&L



28" x 14'0"

Drudgery takes a back seat in roll grinding at Jones & Laughlin's Aliquippa Works.

The three Farrel\* heavy duty grinders they have are easy to set up, easy to operate, and the required accuracy—whatever it may be—is easy to obtain.

For example: The spindle assembly, including bearings and drive, is designed to give the grinding wheel extremely smooth and accurate performance, when either roughing or finishing. The spindle itself is large in diameter for necessary rigidity under working load.

For example: The automatic crowning device, which grinds a mathematically accurate curve, is simply and quickly set, and requires no manipulation during operation. The same setting produces exactly the same curvature and permits fixed, uniform and easily controlled accuracy of contour in all rolls.

For example: Carriage traverse is reversed electrically, automatically, and dwell can be set for any elapsed time required.

These are only three of the features which take the "grind" out of the operation of Farrel roll grinders. For the full story, send for descriptive bulletin.

#### FARREL-BIRMINGHAM COMPANY, INC.

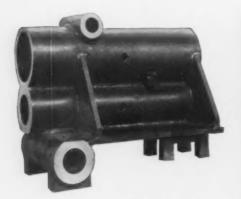
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Chicago,
Fayetteville (N.C.), Los Angeles, Houston

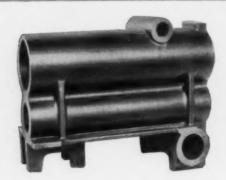
#### FARREL ROLLING MILL MACHINERY

Rolls • Rolling Mills • Rod Mill Tables and Manipulating Equipment • Universal Mill Spindles • Rod Coilers • Slitters • Gears • Mill Pinions • Pinion Stands • Gear Drives of Any Capacity • Flexible Couplings • Roll Grinding Machines • Roll Calipers

Farrel-Birmingham



Welded \$218.57



Gray Iron \$109.67

# Gray Iron Saves \$108.90 Each INCLUDING PATTERN COSTS!



This symbol assures you the most for your casting dollar

Here's why it pays to call in one of the more than 500 leading foundries displaying the Society symbol:

- The most recent technical and business information is available to each member through the Society to help you design better products at lower cost.
- The use of sound cost accounting procedures is recommended and encouraged among Society member foundries, assuring full value for your casting dollar.
- Improved castings result from the advanced techniques and the high sense of responsibility of Society members.

MAKE IT BETTER WITH GRAY IRON

Ultimate savings on this unit are even higher now that pattern costs are amortized.

Gray Iron castings successfully withstand the severe operational stresses to which this housing is subjected. Also, modern foundry techniques make possible the maintenance of the close tolerances required in this component.

This example of Gray Iron's ability to reduce costs and meet special strength and design requirements is not unusual. Chances are that you will find opportunities in your own products for similar savings with Gray Iron... applications where Gray Iron's unique advantages will also contribute to product improvement.

For specific technical or business information about Gray Iron, write direct to Gray Iron Founders' Society, Inc., National City—East 6th Building, Cleveland 14, Ohio.

# GRAY IRON FOUNDERS' SOCIETY



# BIRDIE...thanks to brick!

And impossible without brick. You would have no rubber for the ball... no steel for the clubs. You would have no mower to trim the fairways and clip the greens. And no clubhouse.

Everything made...everything that moves... owes its very existence to refractory brick ... refractory brick that contains and controls the many flames of industry. Brick in infinite variety of shape and composition. There

could be no industry were it not for brick.

And General Refractories, to provide the complete refractory service that industry needs, employs the world's largest, most-modern refractories research laboratory and 66 mines and manufacturing plants both here and abroad.

A Complete Refractories Service
GENERAL REFRACTORIES COMPANY
Philadelphia 2

#### A COMPLETE REFRACTORIES SERVICE FOR THE STEEL INDUSTRY

OLIVE HILL BF and OLIVE HILL HI-FIRED brick rank high in any list of prominent and widely used brands of blast furnace refractories. Manufactured from dense-burning Kentucky flint fire clays by Grefco's unique manufacturing processes, OLIVE HILL brick set a standard for blast furnace refractory quality and workmanship.



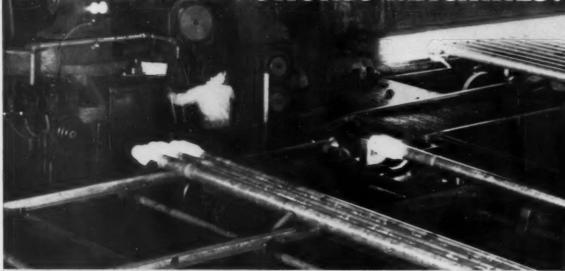
Grefco processing of OLIVE HILL brick entails:

- Careful selection, testing, stockpiling and blending of fire clays to insure uniform raw material quality.
   Grinding and screening to prescribed formula to promote high density of product.
- 3. Efficient deairing during brick forming, also to promote density and proper physical structure.
- 4. Careful firing to exacting temperature schedules to yield uniform high quality brick.
- Close inspection of final product with gauging and sorting of brick to close size tolerance.
- Quality control by statistical analysis procedures for the manufacturing processes.

In service, OLIVE HILL blast furnace brick, both BF and HI-FIRED, have produced many splendid performance records in the past. OLIVE HILL linings in presently operating furnaces, are giving outstanding performance and are more than meeting the increasing requirements of the expanding American Iron and Steel Industry.

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# Jones & Laughlin UPSETS TUBING ON NATIONAL FORGING MACHINES!





Upsetting tubing on a National Forging Machine at the Jones & Laughlin Aliquippa Works.

Jones and Laughlin Steel Corporation, recognized outstanding experts on upset tubing as well as other forgings, rely upon National Forging Machines for this type of exacting work. At present on the job at the Aliquippa Works of J&L, are National 6" and 7½" Forging Machines. Their new 10" National — the largest size upsetter being built today — will be scheduled to go into production soon.

Here is another example in which industry's leaders and National Machinery "team up" to solve difficult forging problems.

If you have a forging problem—large or small, hot or cold, ferrous or non-ferrous—we invite you to send us your samples or prints. Better yet, pay us a visit. Let's approach tomorrow's new and better ways of forging metal parts in the light of methods and ideas which our people are already testing today!

# NATIONAL MACHINERY COMPANY TIFFIN, OHIO — SINCE 1874

DESIGNERS AND DUILDERS OF MODERN FORGING MACHINES . MAXIPRESSES . REDUCEROLLS . COLD NEADERS . DOLTMAKERS . NUT FORMERS . TAPPERS . MALLMAKERS

Hartford

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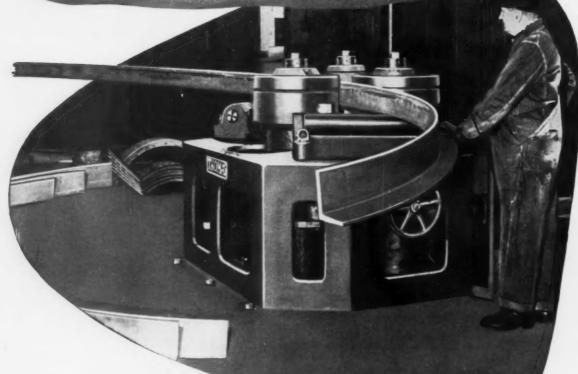


JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. . BOBTON, SI BLEEPER BT. . CHICAGO, 5525 W. ROOBEYELT RD. . CINCINNATI, 3253 FREDONIA AVE. . CLEVELAND, 13225 LAKEWOOD HEIGHTB BLVD. . DENVER, 4801 JACKBON ST. . DETROIT, 915 FIBHER BLDB. . HOUSTON, 6216 NAVIGATION BLVD. . LOB ANGELES, 5340 E. HARBOR ST. . NEW YORK, 19 RECTOR ST. . ODEBBA, TEXAS, 1920 E. 2ND ST. . PHILADELPHIA, 230 VINE ST. . SAN FRANCISCO, 1740 197H ST. . SEATTLE, 900 18T, AVE. S. . TULBA, 331 N. CHEYENNE ST. . EXPORT BALES DEFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

May 17, 1956

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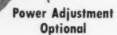
# the trend is to THOMAS ... for ANGLE BENDERS too!



here's why!

- All-steel welded construction . . maximum strength with minimum floor-space required.
  - 2 Furnished complete for leg out or leg in angle bending . . no extras to buy!
    - Quick roll adjustment for width of slot . . quicker change over.
      - Special roll combinations available for beams, channels, flats, pipe, etc.
        - Usual Thomas ruggedness and dependability, as found in all Thomas metal working machinery.
  - Bulletin 314-A contains complete specifications and capacities covering the four sizes and two styles. Write.

PUNCHES . SHEARS . PRESSES . BENDERS . SPACING TABLES



The Power Adjustment of the Movable Roll Shaft is an optional extra. It is used for quickly changing roll centers for different diameters. Machines also may be equipped with Electric Brake on the main driving motor for greater accuracy of bending.

THOMAS

MACHINE MANUFACTURING CO.

PITTSBURGH 23, PA.

THE IRON AGE



Moly carburizing steels with 0.5% Mo are a natural for components like this automotive ring-gear and pinion. They have outstanding properties that suit them to the demands of gearing and similar applications, such as, superior case hardness, low distortion and good machinability. Many features of these new carburizing steels are discussed in a recent technical article. For a reprint, write Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y., Dept. 2.



#### MOLYBDENUM OFFERS THE ECONOMICAL KEY TO PERFORMANCE

Over the years, molybdenum carburizing steels have proved their merits in scores of applications and at every level of production.

**Design engineers** know moly steels for their uniform hardenability, toughness and wear resistance.

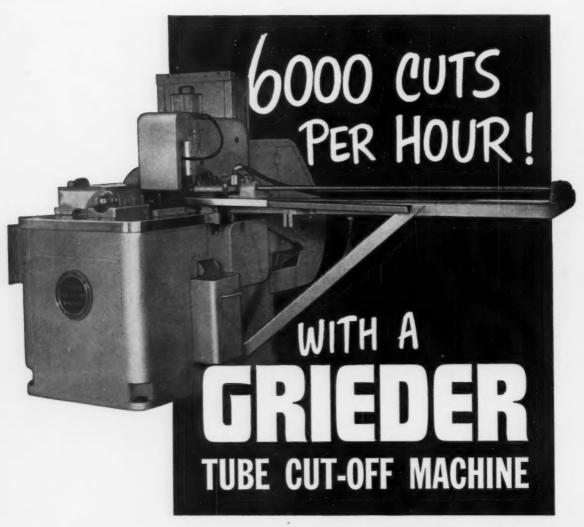
**Production men** know that moly steels are easy to heat treat, easy to machine.

Management knows that moly steels mean economy in fabrication, high performance in a wide range of end products.

Standard molybdenum carburizing steels are widely available. Higher moly analyses may be ordered in heat lots from a number of leading suppliers.

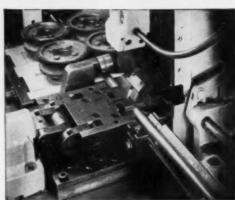
CLIMAX MOLYBDENUM





NO DISTORTION...MINIMUM BURR...
ACCURACY WITHIN .002"...
CUTS ANY SHAPE...

Cut steel tubing at the amazing speed of 6000 cuts per hour. The Grieder Tube Cut-Off Machine features a heavy duty air operated combination clutch and brake unit that allows continuous operation at this terrific rate of production. Fully automatic... Rate of feed: 600 feet per minute ... True cutting. Get full information, multiply your tubing production, reduce costs, write today.





GRIEDER INDUSTRIES, INC.

BOWLING GREEN, OHIO

## Ship fast

UNITED offers 300-mph DC-6A Cargoliner service coast to coast!

UNITED DC-6As offer the cargo protection and dependability of the only radar-equipped cargo flights!

UNITED'S Motorized Tug Bar speeds the loading of heavy parts, machinery!

## Ship sure

UNITED DC-6As have greater tie-down strength than any other cargo plane!

UNITED DC-6As can accommodate tools, parts,
endines up to 8000 lbs. each!

UNITED'S pre-loaded pallets protect delicate shipments from extra handling!

# Ship United

UNITED'S Telemeter Airbill means faster pick-up at terminal points!

UNITED offers reserved Air Freight space on all equipment!

UNITED'S centralized payload control guarantees space dependability!



### Examples of United's Low Air Freight rates—

								F	180	100 lbs."
CHICAGO to CLEVELAND	0		0		0	٠	0		٠	\$4.78
NEW YORK to DETROIT							٠			\$5.90
DENVER to OMAHA .	٠							*		\$6.42
SEATTLE to LOS ANGELES	,			0	۰					\$9.80
PHILADELPHIA to PORTLA	N	D		9				0		\$24.15
SAN FRANCISCO to BOS	TC	N			٠			٠		\$20.20

 $^\circ\mathrm{These}$  are the rates for most commodities. They are often lower for larger shipments. Rates shown are for information only, are subject to change, and do not include the 3% federal tax on domestic shipments.



For service or information, call the nearest United Air Lines Representative. Write for free Air Freight booklet, Cargo Sales Division, Dept. IA-5, United Air Lines, 5959 S. Cicero Ave., Chicago 38.





SPECIAL MACHINERY STEEL CASTINGS

Weldments "CAST-WELD" Design ROLLS: Steel, Alloy Iron, Alloy Steel

DSBORO STEEL FOUNDRY & MACHINE CO., Main Offices in Birdsboro, Pa. District Office: Pittsburgh, Pa.

New York Office Engineering Supervision Co., 743 Fifth Ave., New York 22, N.Y.



Black & Decker electric drills mean low initial costmore convenience, less noise—and they're

# POWER-BUILT The power, speed and accuracy of Black & Decker TO LAST!

The power, speed and accuracy of Black & Decker Drills mean faster, better production, lower costs! The Black & Decker-originated pistol-grip and trigger-switch, the lightweight, balanced power GUAR-ANTEE reduced operator fatigue! And unexcelled workmanship throughout makes your Black & Decker Drills thoroughly dependable, inexpensive, "low maintenance" production workhorses.

31 models assure you of the widest selection of drills, from ¼" to 1¼"... for intermittent or continuous heavy-duty production or maintenance jobs! Call your Black & Decker distributor or write for a free catalog to: The Black & Decker Mfg. Co., Dept. 7805, Towson 4, Md.

Look in the Yellow Pages Under "Tools-Electric"

Drills • Sanders • Polishers • Grinders • Valve Refacers • Vibro-Centric Drivers & Kits • Shears • Vacuum Cleaners • Black & Decker's complete line of portable electric tools—all power-built to make your jobs faster, better, easier!



PORTABLE ELECTRIC TOOLS



#### WHEN MIGHTHOOD WAS IN FLOWER

From the time of the Pyramids until just recently, heavy construction required "gangs" of men. Today, giant machines supply most of the muscle. In our lifetime, an aggressive construction industry has astounded the nation with its everyday miracles. Steel has played its part by developing better-forming, higher strength steels that have resulted in roads, bridges and buildings that last longer, look better and perform more efficiently. These same steels have also helped make possible the modern tools that dig and pound, lift and haul. An important job at Inland is supplying the *right* steels for building and for the tools of building.

INLAND STEEL COMPANY 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York. Steel products supplied to the construction industry include plates, structural shapes, 4-Way safety plate, piling, Ti-Co galvanized sheets, Hi-Bond reinforcing bars, subpurlins. Other products: hot and cold rolled sheets and strip, tin mill products, rail and track accessories, coal chemicals.



# THE IRON AGE

# NEWSFRONT

#### Now It's Ultrasonic Welding

Ultrasonics has found a new application. Work done recently shows that metals in foil thicknesses can be successfully bonded to each other—or to thicker materials—by imposing ultrasonic vibrations on the zone to be welded. No heat is involved, except that in dissipation of the vibratory energy itself. Both similar and dissimilar metals have been joined.

#### **Sharper Competition Coming?**

Rumors persist of a light weight, low cost barbed wire aimed at offering stiffer competition to the influx of cheap foreign barbed wire. The imported wire now enjoys the lion's share of the domestic market. At least one steel company is reported making fairly detailed studies of the possibility.

#### Display Is Idea Stimulator

One machine tool builder has an attention-getting plant demonstration-showroom display. It's conventional to a point; shows typical products made on each machine in the line. Clincher is a thick book within arm's reach with pages keyed to the items on display, giving complete tooling and production data on each workpiece shown. Idea has gone over well.

#### For More Efficient Cleaning

A new low-cost, trouble-free technique for removing organic contaminants from metals prior to painting or coating promises better adherence of the finish. The new technique, perfected by an independent researcher, employs a non-toxic, neutral solution of water, detergents and mild surface activating agents.

#### Contamination Count's Down

Tracer atoms are reported to provide a relatively foolproof method for measuring contaminating effects of refractory linings used in the melting and pouring of steel. Recent tests dealing with 52100 steel melting and pouring practice point up the superiority of high-

alumina brick as an overall lining material. They show lower inclusion counts due to lining contamination than with kaolin or fireclay.

#### **Cuts Non-Linear Screw Threads**

Usable to provide screws wherever a fixed, nonlinear function generator is required in electromechanical equipment, a simple new lathe attachment cuts screw threads with a non-linear pitch. It can be attached to a standard lathe; consists essentially of a vertically moving cam plate that bears against the toolholder carriage and moves it horizontally. Bureau of Standards developed it.

#### **Aluminum Trending Toward Coal?**

Aluminum industry's shift to coal in place of traditional hydro power for one new Texas plant, two slated for upper Ohio Valley, points up recent advances made in new continuous coal-mining techniques, improved power-plant design. Developments have brought costs down to attractive levels, particularly where coal, cheap water transportation combine.

#### Water: How Much Conditioning?

American companies—using more than 70 billion gallons of water daily for boiler, cleaning, processing, cooling and other applications—spend many millions for proper conditioning. How much is "proper" depends, experts advise, on application, local conditions, cost factors. For some cooling, it may be cheaper to rip out an occasional tube than to condition.

#### Domestic Firms Left at the Wire

U. S. firms are irked. Though they were largely responsible for perfecting and marketing it, 90 pct of today's high tensile bronze plated wire reinforcement for truck tires comes from Europe—at 15 pct under U. S. prices. The wire was developed in Europe in '39. But it was largely unused until U. S. steel companies developed the lay of the strand; U. S. tire companies began marketing the tires. Two domestic firms are in limited production.



# BOTH STEEL AND ALUMINUM PARTS ARE PROCESSED IN THE SAME 6-STAGE MACHINE AT TOLEDO SCALE

Steel parts are Granodized, aluminum parts are Alodized to inhibit corrosion and provide an excellent base for the high-grade finish used on these familiar products

Toledo Scale knows that the fundamental prerequisite of a good paint job is a properly prepared base material upon which the finish is to be applied. To provide this all-important base, it Granodizes most steel parts with Granodine® and Alodizes most aluminum parts with Alodine.® Granodizing is a chemical process for the treatment of iron and steel which converts metallic surfaces to a nonmetallic coating of the proper texture for inhibiting corrosion and

greatly increasing the adhesion and durability of the paint finish. Alodizing performs the same functions on aluminum parts.

Both of these processes are performed in the same 6-stage machine. And both add to the long life of the Toledo finish. Perhaps these ACP processes can be used effectively in your plant. Complete data about both of them are available upon request. Write us.



Part of 6-stage machine in Granodizing Department at Toledo Scale Co.

# AMERICAN CHEMICAL PAINT COMPANY, Ambler 20, Pa.

DETROIT, MICHIGAN

NILES, CALIFORNIA

WINDSOR, ONTARIO







# CHICAGO: Metalworking Leader

Windy City's markets match its metalworking and steel making capacity . . . Lake Michigan location and transportation hub big advantages . . . City plans ahead—By K. W. Bennett.

◆ IN POLITE society, Chicago might be described as "pushy." Some people feel the city is suffering from an inferiority complex.

It's a free-wheeling town, has a reputation as a convention city where the girly shows are more sensational. It's had its share of political corruption. It's still living down its era of gangland violence.

But apparently Chicagoans have spent little time looking over their shoulders—or worrying about the past. They've been busy. And the record proves it.

At the moment, Chicago is:

Competing with Pittsburgh as the nation's No. 1 steelmaking center. According to The Iron Age breakdown of steel producing districts, Chicago has held the top spot for the last two years. (But Pittsburgh refuses to concede, bringing up a battery of figures to prove otherwise.)

Hub of the largest concentration of metalworking plants in the country. These plants last year turned out products worth over \$10 billion.

Cover credits Top, left to right: The Hallicrafters Co., Hotpoint Co., International Harvester Co., Electro-Motive Div. Bottom, left to right: Underwood & Underwood, Illinois Central Railroad, United Airlines.

The marketing base for 45 pct in dollar value of the nation's electronic equipment.

The biggest railroad equipment center in the U.S.

The No. 1 truck and rail traffic center.

The second largest air freight terminal in terms of freight tonnage handled.

Main base of operations for the steel warehousing industry.

The nation's third largest petroleum refining area.

#### Not Standing Still

Chicago metalworking is growing at an unprecedented rate. Between 1946 and 1955, at least 935 new firms employing 155,000 per-

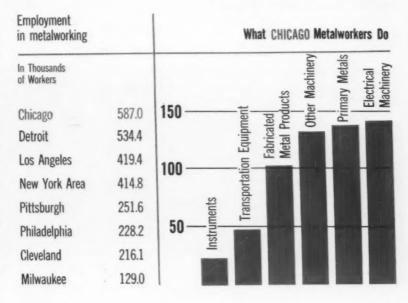
sons moved into the Chicago metropolitan area.

A study by Chicago's Commonwealth Edison Co. to learn what's behind growing demand for electric power gives some idea of what's been going on:

Average annual increase in industrial sales of kilowatt hours since 1948 is 368,400,000.

In the 1945-1955 period, factory awards of \$100,000 and over totaled 501. These contracts were worth \$585 million. Los Angeles ran second with 200 awards, and Philadelphia was second in dollar value with \$581 million. And the boom is still going strong. In fiscal 1955, Chicago almost doubled second place Los Angeles (20 con-

### Chicago Leads the Field





# Far-flung Chicago District leads nation's Steelmaking.

Inland Steel photo.

tracts to 11), though Houston was first in total contract value. These figures are conservative for all areas.

What are some of the reasons behind Chicago's phenomenal growth?

One is location. The city lies in the rich east north central district of country: Ohio, Indiana, Illinois, Michigan, and Wisconsin. For instance, 19 pct or more of all the major appliances, including ranges, refrigerators, freezers, air conditioners, automatic washing machines, were sold in the area. On some appliances, the figure is over 30 pct.

Federal Reserve of Chicago, noting the city's excellent location. points out that the city serves Illinois, Indiana, Iowa, Michigan, and Wisconsin. That area holds 15 pct of the nation's population, takes home 19 pct of the country's personal income, harvests a fourth of farm income, produces one fourth of U. S. factory output. At least 60 million people live within a 500-mile radius, or a truck haul away.

Secondly, success breeds success. A concentration of manufacturing firms brings in other firms to service them, supply them with raw materials and components, as well as equipment.

Companies, like salesmen, know that it's still simpler to call on a concentration of customers than it is to ferret them out over miles of territory. Here's the picture on:

#### METALWORKING

In October 1953, metropolitan Chicago had 1,064,000 manufacturing workers of which 609,100 were in metalworking. In October '54, total manufacturing employment fell to 970,000, metalworking's share to 536,700. At mid-October '55, total employment was up to 1,027,800 and metalworking rose to 587,000. Total employment reached even higher since then.

But good year or bad, metalworking's share of total employment runs better than 55 pct.

Since 1951, Chicago industrial output in dollars has averaged a 4.2 pct gain per year. Metalworking advanced 5 pct per year. Chicago's Association of Commerce & Industry estimates that dollar value of Chicago factory output has risen from \$16.1 billion in '51 to \$19.1 billion last year. Metalworking rose during the same period from \$8.1 billion to over \$10 billion. Of a \$3 billion gain in industrial sales, \$1.9 billion was attributable to metalworking.

In new plant construction since 1951 (contracts exceeding \$100,000 each), an average of 54.9 pct went for major new plants in metalworking categories, with electrical machinery, transportation, and primary metals the principal gainers. In the 1946-1951 period, an estimated 66.5 pct of new industrial construction was by metalworking industries. Value of these contracts, as tabulated by Commonwealth Edison, totals \$275.1 million.

But the Commonwealth Edison figure is extremely conservative. Some sources estimate total industrial building in the past decade at \$2 billion. The Association of

# Versatile Chicago's

Giant forgings at Kropp Forge. Transmissions at Borg Warner.





Commerce & Industry estimates 1955 investment in plant facilities at \$555 million, compared with \$232 million in 1954.

#### STEELMAKING

To keep pace with the feverish tempo of metalworking, steel producers in The Iron Age Chicago district expanded annual capacity by over six million tons between 1948 and 1955. In the same period, the operating rate of these facilities averaged 94 pct. It is the only Iron Age district with above 10 million ton annual capacity to operate at such a pace.

#### STEEL CONSUMING

In a 1948 IRON AGE survey, Chicago finished second to Detroit as a steel consuming area—4.2 million tons compared to 4.8 million tons. Milwaukee, served mainly by Chicago district mills, was third with 2.4 million tons.

It's estimated that Chicago now consumes about 5.7 million tons per year, and that Detroit may have gained relatively less ground due to the transfer of large steel consuming operations to Cleveland, Chicago, Kansas City, St. Louis, and other sections.

#### LABOR SUPPLY

Chicago offers a reasonably large labor supply. Skilled workers are scarce, but the same situation prevails elsewhere. Unskilled workers are in good supply, with at least 2500 pouring in each month from the South.

At least five major universities and colleges in the area supply a reservoir of professional workers, though demand far exceeds supply. A major concentration of at least 1200 industrial research labs provide a backlog of research and engineering personnel for small firms who must farm out work.

Chicago's work force has increased about one-third since 1948. But with an influx of new plants, it's evident that increased worker productivity possible in newer plants has given an added shot-in-the-arm to output.

#### TRANSPORTATION

One of Chicago's major advantages. It boasts 15 railroad belt lines and 18 trunk lines. Two new superhighways come into the city from a projected toll road circling the city. Some \$320.7 million has been requested for highway improvement, \$1.6 million for river

and harbor work, and \$36.1 million for airport improvement.

After limping as a one-airport town for years, and even under this handicap racking up an airfreight tonnage second only to New York City, Chicago is now moving into a new and larger airport, O'Hare Field.

#### CONSTRUCTION

Dodge Reports on seven major metropolitan centers indicate that since 1950 Chicago's general building rate has been increasing by an average of 21.2 pct per year dollarwise on contracts let. Chicago made a slow start in 1952, but has been gaining momentum. It beat the '52 dollar outlay for new construction by 25 pct in 1953; beat '53 by 29 pct in '54; beat '54 by 52 pct in 1955. This year will be the third in which new construction in Chicago passed the billion dollar mark.

A February poll of the Chicago chapter, National Assn. of Purchasing Agents, indicates that a climb of as much as 32 pct in new industrial construction, plant renovation, and capital equipment expenditures is possible this year.

As a result, the entire city is gaining ground as a consumer as well as a producer of manufactured

# Diverse Metalworking Markets



Appliances at Hotpoint.

Tractors and implements at

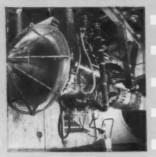
International Harvester.

Motion picture equipment

at Bell & Howell.



Refineries like Standard Oil's create markets.



Ford builds jet engines.



Illinois Central humps freight.

goods. Thus far the surge shows no sign of faltering.

#### WATER

Water for the suburbs, where most new industrial construction is underway, has been a problem. But the solution is moving into view. Chicago is planning to extend its water facilities through the metropolitan area to serve an additional 85 suburban areas as well as the 51 already being served. Suburban industrial water supplies have not discouraged in-

dustrial expansion thus far, but further easing in water supply could make a good thing better.

#### HOUSING

The housing situation has eased, though prices are stiff. The average home sold for \$5,546 in 1945 and now costs \$13,992 and is rising. Similarly, industrial land values are climbing, though suburban farm land may still be found at \$1500-3000 an acre. Land values have climbed as much as 10 times in the last 10 years. An industrial property near the downtown area brings \$100,000 an acre, and choice suburban industrial sites \$25,000 an acre.

#### MARKETING

Chicago is a convention town. Convention attendance this year is expected to surpass 1955 when an estimated 1,276,330 conventioners attended 1127 meetings in the city.

With convention centers going up in New York City and Detroit, Chicago is beginning to move in haste to replace the stockyard amphitheater with a somewhat fresher location along the lake front. After some footdragging, this project is beginning to move swiftly.

For the indirect sell, Chicago ad agencies still play a background fiddle to New York, but at least 10 Chicago agencies placed better than \$10 million in advertising each last year, and three of these were among the nation's top ten.

On the debit side, natives like to comment that Chicago grows despite anything city administrations can do to discourage it. But recent administrations have been pushing hard to make Chicago a more attractive place in which to manufacture—and they are succeeding.

Number one problem is lack of expansion room in the city. Second is traffic congestion.

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## PROFITS:

#### Warehousemen experience lowest in industry

"Profits in steel warehousing are among the lowest in American industry," Robert G. Welch, executive secretary, American Steel Warehouse Assn., told members at the 47th Annual Meeting in San Francisco.

This in spite of the fact that 1956 is expected to exceed 1955's all-time record of 15.7 million tons handled.

Margin on sales after taxes averaged 2.5 pct last year for ware-housemen compared to 7.8 pct for iron and steel producers and 9.5 pct for non-ferrous producers, Mr. Welch said.

"Galloping inflation has almost doubled the expenses of ware-housemen in the last four years. The situation has been going on in our industry to such an extent that we are endangering our future by not trying to correct it," he warned.

#### **Problems Cited**

Stating there was no simple solution to the problem, he urged warehousemen to search for better methods of handling and storing by giving more consideration to order pattern; to search for advanced methods of warehouse layout; improve ways of using automatic tabulating and recording devices; cut down on paper work and improving of ordering technique.

"Slow turnover is an ever-present problem," he stated. "Careful market analysis by customer, industry and by product can be a major part of the answer to slow turnover. Certainly there are better methods of locating and studying our markets. A part of the answer can be in the caliber of men in the industry. We must attract more bright young men into the field."

During the meeting, Paul O. Grammer of Grammer, Dempsey & Hudson Inc., was re-elected president of the association. Mr. Welch was re-elected executive secretary. More than 600 steel warehouse and steel producer executives attended.

## **COPPER: More Pesos for Producers**

Shift in Chilean copper policies benefits American subsidiary producers . . . Free Market rate means more pesos per dollar . . . New labor law aimed at promoting stability—By F. J. Starin.

♦ THE SITUATION of the American subsidiary copper producers in Chile is much like that of a man with a tooth ache and a stomach ache at the same time. When one goes away he feels so much better that he hardly feels the discomfort of the other.

Recent developments have made the copper companies' position more comfortable. But operating copper mines and refineries in Chile continues to be difficult and ticklish.

One of the major moves made by the Chilean government primarily to combat inflation, but nevertheless benefiting copper producers to the tune of millions of dollars, is the switch in currency exchange system from multiple (official and free market) to a single free market rate.

Previously producers had to exchange dollars for pesos at a rate of 300 to 1. This was in the midst of a raging inflation when actual free rate was as high as 900 to 1.

#### Major Move

Reliable sources indicate that at present copper companies are able to get 500 pesos for a U. S. dollar in some of their transactions. The percentage which still must be bought at 300 to 1 is actually transitory.

This is really a major concession on the part of the government, since it had been using a shifting exchange for political and economic expediency. The system went something like this:

Groups importing such staple items as wheat were given a favorable rate of exchange—more of their own currency in exchange for fewer Chilean pesos than the free market rate. This served to lure more wheat into the country. And it permitted the government to influence sellers to keep prices down.

The loss incurred in this transaction was made up by giving such industries as copper a lesser exchange rate—fewer pesos per dollar than the free market rate. The books balanced and the voters were kept happy, but the copper companies took a loss.

The fact that producers benefit from the switch is of little immediate interest to Chile. But government is certain to bring this up should she feel American subsidiaries could be of assistance in raking her chestnuts from the fire because of any future, unexpected shift in markts or prices.

#### In Return

On the matter of production, Chile and producers are both on the same side of the fence. Late last month a commission from the Copper Dept. of the government submitted a 51-article statute to President Ibanez for signature. One of the key articles is extension of collective work contracts to 15 months, in an attempt to promote labor stability.

This will have more of an effect on Anaconda as far as total output is concerned, then Kennecott, for several reasons: Anaconda's contract runs out June 1. With the heavy investments being made by the company, an amicable settlement on a new contract would mean 15 months of steadily increasing production. This would mean over 600 million lb from the two major Anaconda subsidiaries in 1956.

#### Problems

Kennecott is limited by a hydroelectric problem. Power is supplied by force water from melting snow in the mountains. During winter when no snow is melting, production must be curtailed. Labor peace, minimizing rather than accenting the necessary short production period, is a must for increased production. With normal operation for the rest of the year Kennecott 1956 output still can't be much higher than 300 million lb.

Producers policy generally forbids making public information on the extent of ore reserves. Reason is ore isn't considered reserve unless it can be mined and refined at a profit. Sudden shift in world copper situation could conceivably effect extent of total Chilean production.

### To See How The Other Half Lives

- Three man committee from Chile's Copper Dept., will tour world copper markets for first hand look.
- Group will leave Chile this week with the first stop scheduled in this country. Entire trip is expected to take three months.
- Recent fluctuation in world situation, costing Chile money, is reason for the junket.
- Market conditions and length of the tour may mean that information gleaned at outset may be totally altered by the time the Chileans get home.

# STEEL: What Will Price Probe Show?

Sen. Douglas schedules probe of steel prices . . . Industry contends it needs broader earning base for expansion plans . . . Most prices of steel making materials have climbed more than steel prices.

 STEEL PROFITS and prices are about to feel the heat from Washington—again.

Sen. Paul Douglas, Illinois Democrat and a tough economic investigator, is pushing his Senate-House Economic Committee staff to wrap up preliminary work on an investigation of steel industry wages, profits, and prices.

Although the senator's own inclinations are to call steel men to Washington before or during labor negotiations, it is doubtful if the investigation would get into full swing until after a labor settlement is reached.

#### Not Defensive

But whenever the probe gets going, it won't find steel on the defensive. Steel leaders have been at work for months building the case

for higher returns to attract capital for expansion—expansion which is needed to satisfy the demands of national defense and an expanding economy.

And steel has a good case of its own to point to. Steel prices generally have not kept pace with higher costs of wages, materials, and expenses of doing business.

Sen. Douglas' committee has approved generally a sweeping investigation of prices and inflationary pressures, and he is relatively free to call hearings whenever he is ready.

A committee staff official says that preliminary work on the steel probe will be completed in about three weeks, at about the time labor negotiations get down to brass tacks. A personal aide to the senator points out that the resolu-

tion authorizing the probe specifies that it must begin before Congress adjourns, about July 15. "We can't wait too long," he says.

#### What's Behind It?

Reasons for Sen. Douglas' attention at this time are obvious. High steel profits in 1955 followed by record first quarter returns, all coming on top of talk of higher prices before wage increases, indicate fertile grounds for a prober of Douglas' nature and ability.

But what is the case for higher steel prices?

Last year steel wages went up something more than 15¢ an hour. Shortly after, steel prices were raised about \$7.35 a ton. Traditionally, the price increase is supposed to be based half on higher labor costs, half on higher prices for materials and services. Idea is that steel price increases quickly spiral back to the mills.

The labor side of the issue is clear. Steel prices and wages have both climbed about 8 pct since last June. Since 1949, steel wages have climbed 50 pct, steel prices 40 pct.

For tonnage raw materials, steel has caught it hard in the past year and in the past several years. Scrap prices have jumped more than 40 pct since last July. Even with the current easing of the scrap market, prices of best steel-making grades are well over \$50 a ton. With scrap making up about half of the charge of an openhearth and nearly all on an electric furnace, the price level is a serious matter.

Iron ore prices have moved pretty much in line with steel prices. This year's ore prices are up 7 pct over 1955 and over 40 pct from 1949. Rolling equipment prices rose 35 to 60 pct.

## Steel Prices vs. Steelmaking Costs

	1950	1956	Pct. of Increase
Finished Steel	3.86¢ per lb.	5.179	▶ 34
	1.69 average hourly earnings	\$2.60	54
Wages	\$34.75 gross ton	\$53.17	<b>→</b> 53
Scrap (Iron Age Composite)		\$10.85	<b>4</b>
Iron Ore (Mesabi)	\$7.70 gross ton	420.00	4
Pig Iron (Iron Age Composite)	\$45.98 gross ton	\$60.29	→ 3
Refractories (Silica Brick)	\$88.03 per thousand	\$128.00	45
Retractories (Silica Drick)	\$5.8 billion	\$9.1 billion*	5
Invested Capital		*May 7	

While Steel Prices Climbed - Most Costs Climbed Higher

Looking at profits alone, the steel industry is not faring too badly. Mills showed improved margins in 1955 and even better rates so far this year. But the steel industry believes that income, at present depreciation allowances, is too small to provide for expansion and replacement of basic facilities.

#### Replacement High

U. S. Steel chairman Roger M. Blough points out:

An openhearth furnace that cost \$10 million to build in 1930 will cost \$64 million to replace today. "Through depreciation, we have recovered the original \$10 million," he explains. "The remaining \$54 million will have to come out of our profits."

#### For last-minute news of industry, see "Metalworking Briefs" column on page 172.

He doesn't believe that current profits are high enough to pay for U. S. Steel replacement spending of \$350 million a year for the next five years and expansion spending of \$150 million for the next 10 years. Unless depreciation laws are changed or labor changes its rate of wage increase, the only solution, Mr. Blough feels, is a price schedule that gives bigger profits.

#### Cost of Expansion

C. M. White, president of Republic Steel Corp., notes that his company's current \$187 million expansion program is being built around existing plants and equipment. This will cost Republic about \$85 per ton of capacity and will be financed mostly out of retained earnings.

"Our next expansion program," Mr. White says, "will probably mean an outlay of approximately \$200 million per ton even at present construction costs." Beyond that, an entirely new plant supported by raw material reserves will represent an investment of approximately \$325 per ton.

Mr. White agrees that if Republic is to obtain funds for future expansion, it must create an earnings base which will support large

borrowings and to encourage investment.

Improving steel's earning ability to attract needed risk capital for expansion is not a new concern of the steel industry. But it has been stressed with even greater emphasis during the past year when necessity to expand became apparent.

In spite of the avowed intention of the industry to raise prices to improve its earnings base, it is interesting to note that Wall Street still views steel stocks with some skepticism.

#### Small Margin

One investment service, for example, predicts that regardless of industry intent, the price increase will barely cover higher costs and that profit margins will narrow in the second half of 1956, with 1957 earnings down somewhat.

This particular investment adviser recommends taking profits on "present commitments in steels and to shift investment funds either into a cash reserve or into sound, price-stable defensive equities."

This outlook is based on the assumption of a moderate decline in steel business in the second half of 1956 and into 1957, an assumption that may be on the pessimistic side.

While the advice of any particular investment counselor isn't necessarily to be taken at face value, it does indicate the difficulty prePRICING

sented to any steel company in attracting risk capital.

Returning to the short term view, steel has had more than its share of increased costs to contend with in the past year. Here are some examples:

Refractories: fire brick, first quality, from \$114 to \$122 per 1000; silica brick, from \$120 to \$128; magnesite brick, standard, from \$109 to \$114 per ton.

Pig iron, foundry, from \$56.50 per ton to \$60.50.

#### The Figures

Ferroalloys: Ferrosilicon, 50 pct, from 11¢ per lb to 12.75¢; ferromanganese, 80 pct, from 9.5¢ to 10.75¢; ferrochrome, standard, hi. carbon, from 24.75¢ to 26.25¢.

Scrap: \$39.50 per ton, July, 1955, to \$53.17, May 8, 1956.

Limestone has climbed about 6 to 7 pct, charging machines and accessories are 50 pct higher, and freight rates are up from 4 to 7 pct.

In comparison with costs of steelmaking, prices actually have climbed moderately.

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### Why Depreciation Is A Problem

- There is no immediate prospect of Washington action. Steel companies must get together and decide on definite proposals. There has been no move in that direction to date.
- Only general courses of action have been mentioned. One would allow mills to depreciate equipment on the basis of replacement reserves.
- Difficulties of keeping replacement and expansion funds separate create problem. Most replacement projects also represent expansion because of greater efficiency of new equipment.

## **RESEARCH: Big Centers Mark New Era**

U. S. Steel labs at Monroeville and General Motors Technical
Center at Detroit are completely integrated . . . Both already have made sizeable contributions to product development, technology.

◆ TWO OF THE NATION'S largest corporations recently dedicated multimillion dollar research centers—signifying big business' total acceptance of the laboratory as an integral part of industrial development.

U. S. Steel's Roger Blough cut the ribbon that officially opened the corporation's Monroeville, Pa., research center. A few days later, General Motors christened its big technical center near Detroit.

#### Improving Stainless

The Monroeville center, described as the largest of its kind in the steel industry, houses both fundamental and applied research groups. Dr. Edgar C. Bain, vice-president, research and technology, said basic research would be stressed by USS as an important tool of progress.



PLASTIC blast furnace model is used at U.S. Steel Research Center for gas and solids flow investigations.

At Monroeville, stainless steel will be developed for use in supersonic aircraft design. Close tabs also are being kept on titanium, aluminum-coated steels and plastic-coated steels to meet possible competition from the plastics and aluminum industries.

Regarding the aircraft market, USS officials see new temperature requirements in supersonic flight as bringing a swing to stainless steel. Although thin-gage rolling of stainless does present problems, sheets below .006 in. have been rolled.

Other projects under fire at Monroeville are continuous casting processes and sintering as a means of increasing the ratio of iron to high-priced scrap in steelmaking.

#### Cost Pro-rated

General Motors Technical Center, operating on a partial basis for several years, now has become a completely integrated unit with the recent inclusion of a process development section. The center is composed of four central staff organizations: research, engineering, styling and process development. Each staff is concerned with immediate problems and long range projects as they affect the various divisions of GM and the corporation as a whole.

Funds to operate the GM Center come from two sources. First, each GM division is assessed on a pro-rata basis. Second, any division that brings a specific problem to the center is billed for the services. In this way, staff organizations are able to operate in much the same way as private or public research foundations.

The research section is concerned with the fields of metallurgy, chemistry, physics, and many phases of mechanical engineering. At present, the unit is concentrating on development of strategic metals because of the emphasis that has been placed on gas turbines. This section also is capable of handling projects in the field of nuclear energy.

The new process development section operates in the area of special engineering and research prob-



SINGLE cylinder engine is used in the high compression studies at the General Motors' Technical Center.

lems in manufacturing.

Each GM division has, to some extent, organizations similar to those at the technical center, but big jobs can be taken to the center either for solution or advice. Process development, for example, recently pioneered in the design, testing, and installation of a semi-automatic machine for the assembly of spark plugs. The project was undertaken at the behest of AC Spark Plug Div. The resultant machine was so successful that AC ordered a battery of them.

## **ROD: New Giant Mill At Cuyahoga**

No. 1 Mill at American Steel Wire Div. called most advanced ever... Expected to replace two older mills... By year's end will be producing steel rod at rate of 450,000 tons annually.

◆ NEW ROD MILL capable of producing 450,000 tons of steel rod a year is undergoing shakedown operations at American Steel & Wire Division's Cuyahoga Works in Cleveland

Claimed by U. S. Steel to be the "most advanced rod mill ever conceived and constructed in the steel industry," it can produce four lines of rods simultaneously at more than mile-a-minute speeds.

The giant, dubbed "Rod Mill No. 1," eventually will replace the yearly 360,000 ton output of No. 2 and No. 4 rod mills.

#### **Automatic Features**

Included in the new facility are billet and rod storage areas, a mechanical billet "unscrambler," a furnace capable of heating 100 tons of billets an hour, a hydraulically operated billet conveying system, 25 rollstands capable of rolling all sizes of rods from commercial No. 5 gage (.218 in.) up to 1½-in. sizes, 10 stand-driving motors with a total of 13,500 hp, automatic water spray and forced air cooling systems and air conditioned operating pulpits.

The billet unscrambler automatically unpiles batches of billets and positions them in a single layer ready for entry to the furnace run-in table. The furnace is of two-zone construction with a hearth area 38 ft wide and 70 ft long and has side charge and discharge openings. The fuel used can be natural gas, coke oven gas, or fuel oil. A refractory recuperator provides 700 degree preheated air.

Billets are charged four at a time from the furnace run-in table, with about 256 billets in the furnace being heated at one time. A single billet is brought to rolling temperature of 2150 degrees F in about an hour and a half.

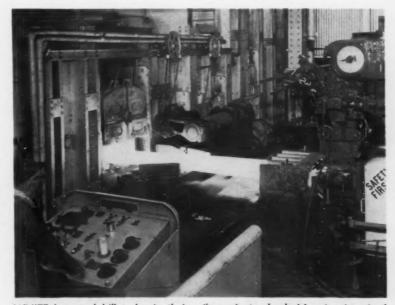
Through use of various stands available, the mill will produce both fine and coarse rods in bundles up to 1200 lbs in contrast to former bundles of 300 to 600 pounds. The rolling operation is controlled from one main air-conditioned operating pulpit. From his vantage point, the operator can at all times see each stand and adjust speed as conditions require. There is also a control desk for the furnace discharge operator, a control desk for crop and cobble shears and separate pulpits for laying and pouring reels. Design and erection of the mill was under supervision of Floyd A. Garman, chief engineer, and Morgan Construction Co.

#### **Furnace Recuperator**

Formation of a new company to manufacture and market the so-called Schack recuperator for industrial furnaces and soaking pits has been announced.

The new firm, Griscom-Russell-Schack Co., Inc., will have its headquarters in Pittsburgh. Griscom-Russell Co., manufacturer of heat exchangers, has begun manufacture of the units at its Massillon, O., plant. Orders have been received from Rust Furnace Co., and Loftus Engineering Corp., Pittsburgh.

K. B. Ris, president of Griscom-Russell, is also president of the new firm. Dr. Alfred Schack, president of Schack Rekuperator Co., Dusseldorf, Germany, is chairman.



WHITE hot steel billets begin their mile-a-minute slenderizing treatment at new American Steel & Wire rod mill, Cuyahoga Works, Cleveland. Each 34 ft billet will be stretched out to 9000 ft, thin as a pencil.

# **ENGINEERS:** Too Many Going Astray

Three out of four graduate engineers wind up in non-technical jobs, aggravating a critical shortage . . . Experts agree that specialization in college must go . . . Urge return to fundamentals—By G. J. McManus.

• ENGINEERING SCHOOLS must turn out men who are equipped to do anything. That's what industry spokesmen told educators at a recent session of the American Society of Engineering Education.

Meeting at Carnegie Tech, the Allegheny section of the society heard industry representatives talk about present, future, and past engineering needs. Gist of their remarks was that no one knows what the future holds for individuals and industries; the young engineer must be prepared to perform well in a wide range of situations.

Achieving this versatility, say the industrialists, is not so much a matter of the quantity as the quality of the education. They want engineering studies at the undergraduate level kept broad and fundamental. Early specialization should be avoided. The engineer should not be trained for a particular job; he should be given an education that permits future growth into many jobs.

Gulf Oil's Jerry McAfee explained why technical advances call for less, rather than more, specialization. Manufacturing vice president at Gulf, he said progress in the petroleum industry has been so rapid that an engineer trained exclusively for methods of a few years ago would be lost today.

#### Surveys Reveal Exodus

United States Steel's E. L. Tindall felt that even without radical changes, early specialization could be a mistake. He said that most engineers branch out after graduation. Very often they land in fields they had not even considered earlier. A goodly number go completely out of engineering work. Mr. Tindall said a recent survey at U. S. Steel had turned up a surprising number of engineers in non-technical work.

These findings jibe with those of a survey by Carnegie Tech. Last month, Tech asked 11,500 engineering graduates what they were doing now. Only one-fourth

listed engineering as their occupation. Among the others, there were 329 company heads, 20 clergymen, 7 band directors, 22 physicians, and one U. N. delegate. Cabinet member Charles E. Wilson gave his occupation as secretary.

School men have recognized for some time the need to prepare engineers for a wider range of activity. Several years ago, Carnegie Tech introduced a program of humanistic-social studies. This occupies about one-fourth of the undergraduate curriculum, aims at equipping the student for non-technical functions, both on the job and away from it.

#### Creative Thinkers Wanted

Industry people go along with this thinking to some extent. "We like our engineers to have at least a 'nodding acquaintance' with the outside world," says R. A. Ramey, manager, New Products Engineering Dept., Westinghouse Electric Corp.

"It's not enough for an engineer to come up with the solution of a problem," says Mr. Tindall. "He must be able to communicate his ideas to others."

In strictly engineering studies, industry also approves the educational trend.

In the Carnegie discussions, there was some feeling that schools were going overboard on genius at the expense of fundamentals. Commenting on a suggestion that mechanical drawing be dropped from the engineering curriculum. Mr. Tindall said he felt this would be a mistake. He told of cases where engineers could not read blueprints and he said the basic tools must be supplied students.

### **BRAINS: Engineering Bottleneck**

- Ninety pct of U. S. men don't have the mental capacity to make an engineer. Only 10 pct have I.Q.'s of 120, considered the minimum requirement.
- That means a maximum of 68,000 high school graduates each year who are capable of engineering studies. Of these, many are lost because of inadequate
- high school training, lack of interest or cash.
- Of those who go through engineering schools, many move into non-technical work after graduation. Carnegie Tech finds that three-fourths of its 11,500 engineering graduates are in non-technical work.

### MISSILES:

#### Aid to foreign nations may include them

American aid to foreign nations allied against Communist aggression will be expanded to include some of the latest U. S. defense weapons, if current plans of the Eisenhower Administration are fulfilled.

Administration spokesmen strongly recommend to Congress the appropriation of about \$4.9 billion in new foreign assistance money for fiscal 1957. Included in this amount would be \$500 million for deliveries of advanced weapons, possibly including the Nike antiaircraft missile and the Honest John rocket.

John B. Hollister, head of the U. S. foreign aid program, says arms of new types can counter the growing strength of Communist military forces and will convince our allies that they are getting modern materials of defense. He is to discuss for the Senate Foreign Relations Committee the extent of Russian aid programs, says Committee Chairman George, D., Ga.

#### Billions Asked

Sen. George cautions that the Administration may not get the full \$4.9 billion it requests, although President Eisenhower has asked congressional leaders to vote for the funds as an investment in mutual security. The request this year is \$2.2 billion more than the foreign aid budget for fiscal 1956.

A Senate authority on federal spending, Sen. Byrd, D., Va., estimates that foreign assistance funds will total \$11.5 billion in fiscal 1957, if the \$4.9 billion request is approved. He reaches this total by adding the proposed new appropriation to \$6.6 billion in unspent balances from funds approved in previous years. The \$11.5 billion, he figures, would include \$4.3 billion to be spent in fiscal 1957.

President Eisenhower's keen interest in the foreign aid appropriation improves chances for congressional approval of a substantial portion of the amount asked. But the law-makers appear reluctant to undertake continuation of aid on a long-range basis, though the President inclines toward this.

He proposes to establish a special commission to survey U. S. aid projects and report to him by next Jan. 20. This group, as he sees it, would recommend changes in the current program.

In the final six months of 1955, Mr. Eisenhower tells Congress, the U. S. delivered \$900 million in military supplies to friendly nations in Europe and the Far East. Forces aided by this equipment are said to equal more than 200 divisions, more than 2,000 ships, and about 300 air squadrons

He suggests that to meet Soviet shifts in tactics there should be "greater flexibility."

### SPENDING:

Military appropriation for \$33.6 billion likely

A \$33.6 billion defense appropriation, with heavy emphasis on building up this country's air and missile might, is pending in the Senate where it will probably be raised if it is tampered with at all.

#### DEFENSE

Overwhelming approval of the huge money bill in the House (377-0), makes passage virtually certain in the Senate. An attempt may be made in the Senate to add another \$1 billion for more B-52 jet bombers. A similar proposal was voted down in the House.

The bill, only \$512 million less than the President requested, will give the Pentagon a total of \$49.1 billion in the new fiscal year with carryovers of unspent funds, but the military expects to be able to spend only about \$35.5 billion.

Air Force will get the lion's share of the new money, \$15.4 billion, including \$6 billion for aircraft procurement of which \$2 billion will go for 202 additional B-52's toward a goal of 500 by 1958. The Army will get \$7.5 billion, and the Navy \$9.9 billion.

The Navy will expand its fleet from 985 to 1005 with 23 new ships and the rest from the mothball fleet. Thirteen of the new ships will be guided missile ships, one of them atomic powered; six will be atomic submarines and advance work will begin on an atomic aircraft carrier.

## Dig that Big Emplacement



• GIANT earth auger, built to dig a hole six ft in diameter to a depth of 22 ft, is being tested by Army Corps of Engineers. The truckmounted digger can operate either vertically or from an angled position as shown here.

The digger was developed by the H. B. Williams Manufacturing Co., Dallas. The 12-ton giant augertype digger is a possibility for digging emplacements or shallow wells.

Advantages would be mobility of operations and tremendous time saving if the unit tests out as expected. It would be a welcome addition to the ground forces to GI's who know the frustrations of digging earthworks, latrines, and other groundworks.

# EXPANSION IN INDUSTRY

#### Laclede-Christy Program

Laclede-Christy Co. Div., H. K. Porter Co., Inc., is putting its announced \$1.5 million expansion program into high gear with the installation of new equipment at its Christy plant, St. Louis.

Equipment will consist of new grinding, screening and sacking unit aimed at increased production and improved quality of refractory castables and mortars.

Also planned as part of the program is installation of new gas burning equipment at the Laclede plant at Clearfield, Pa. Facilities are expected to boost production of fire brick by 15 pct.

Mechanization and modernization project is already underway at Laclede's Ottawa, Ill., plant, but new expenditures will be made for standby oil burning equipment, and equipment for feeding, blending and general storage.

New supplementary equipment at Canon City, Colo., is aimed at increasing manufacturing capacity of silica refractories.

#### Bliss Mill

New 4-high reversing cold mill, designed and built by E. W. Bliss Co., Salem, O., is the key piece of equipment installed by Newman-Crosby Steel Co., Pawtucket, R. I., in an expansion program aimed at boosting company output by 40 pct.

Newman-Crosby is using the new mill to roll high carbon and alloy spring steel in range of gages between 0.125 in. and 0.10 in. Through use of special techniques the company has been able to use the mill to roll strip as thin as 0.006 in., well below design limit.

#### Supercharger Project

Small turbine and supercharger dept., General Electric Corp. will be the object of a \$1.2 million modernization and expansion program.

Primary objects of the plans are erection of a new high pressure boiler plant and addition of a 10-ft vertical boring mill to the production line.

Boiler plant, producing steam for testing purposes, will feature a 60,000 lb per hour boiler and a superheater with an initial steam output of 1800 psig at 1051 degrees F.

Many other smaller machine tools will be purchased as part of the project.

### **Expansion Briefs**

Universal-Cyclops Steel Corp., Bridgeville, Pa.; constructing production pilot plant for the consumable electrode vacuum remelting of special alloy steels.

Globe-Wernicke Co., Cincinnati; purchased site on which its plant is located, plan expansion and improvement project.

General Electric Corp., Schenectady; 5-year expansion program in small aircraft engine div.; cost about \$20 million.

Arthur G. McKee & Co., Cleveland; landed multi-million dollar contract for modernization of Esso Standard Oil refinery in Cuba.

# Forging:

U. S. Steel First in vacuum casting

Vacuum casting of large forging ingots is scheduled to begin at U. S. Steel's Duquesne Works in a few weeks.



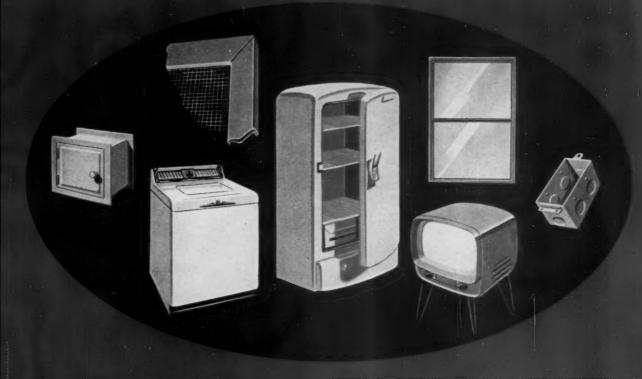
Vacuum Casting

The process is expected to make possible heavy forgings of improved quality; eliminate effects of gases in steels designed for jet engines, high temperature bearings, large shafting aircraft parts, and other applications; reduce need for extensive testing of castings before shipment.

The Duquesne installation will be the first of commercial size for vacuum casting of large forging ingots. Developed largely through the efforts of U. S. Steel's research department and American Bridge Div., the facilities consist of a steel chamber in three sections—a base, a top and a cylinder. The chamber is 31 ft high and 17 ft in diameter.

After a vacuum has been created, metal is poured into a basket ladle on top of the chamber. Heat of the molten steel melts an aluminum diaphragm and the steel enters the mold at a controlled rate of from three to 10 tons per minute. During this process, harmful gases are extracted. After pouring, the vacuum can be broken and the ingot allowed to cool. Cooling requires at least two days.

in the long run, galvanized steel



in the longer run. WEIRKOTE

More and more, Weirkote is proving itself to manufacturers of a wide variety of products—under the sternest tests—as a galvanized steel that goes far beyond ordinary galvanized steels.

A special continuous galvanizing process is quality-controlled all the way to make Weirkote withstand the severest stresses of fabrication. Its tightly bonded zinc coat resists cracking, peeling, flaking; resists corrosion for moisture cannot penetrate to attack the steel underneath.

And Weirkote's greater strength, rigidity and heat-resistance provide longer life with little or no maintenance.

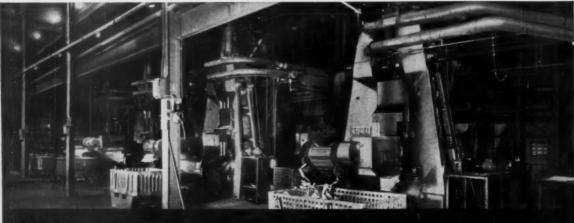
So for durability, economy, appearance . . . in the longer run, Weirkote is your best buy. Put it to work now improving your product . . . and your profits!



WEIRTON STEEL COMPANY

NATIONAL STEEL CORPORATION





Four of six Ceco-Drops which replaced Board Hammers in a large automobile forge shop

#### CECO-DROP

The Ceco-Drop was selected because of better maintenance record and case of operation



High production is maintained—there are no boards to change—fewer ad-

CECO-DROP

The Ceco-Drop is safer and easier to operate. 'Leg fatigue' is eliminated. There are no overhead hazards



Parts shown here are typical Ceco-Drop forgings

CECO-DROP

They are automobile shock absorber parts—pitman, anchor and arms

Have you the latest CECO-DROP bulletin? Write CHAMBERSBURG ENGINEERING COMPANY, Chambersburg, Pa.

THE IRON AGE





**Black cutting cil** (left) makes close control difficult. Operators dislike dirty operating conditions it creates. Close control is easier and workers are happier with transparent Sunicut cutting oil (right).

## WHY USE A BLACK CUTTING OIL WHEN YOU DON'T NEED IT?

#### Sunicut oils give you better visibility without sacrificing machining efficiency.

When trying to maintain close control over machines producing precision parts, operators can be handicapped by "black-oil blindness". It is hard to see the tools, the workpiece, and the finishes. Checking close tolerances is difficult when the graduations on micrometers and gauges are obscured.

Worse still, as the operator sees it, are the dirty working conditions caused by dark oils. His clothes get saturated with hard-to-remove stains, and his hands are black from one end of the shift to the other.

Transparent Sunicut oils help keep your operators happy and will make close control easier ... and transparent Sunicut oils will do the job with no sacrifice in machining speed or finishes.

To get the full story on Sunicut oils, see your local Sun representative, or write Sun Oil Company, Philadelphia 3, Pa., Dept. I-41.



SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL



For any machining or grinding operation...

## THERE'S A SUN OIL THAT'LL GIVE YOU HIGH EFFICIENCY AND LOW OVER-ALL COST

No two machine shops have exactly the same problems when it comes to selecting cutting oils... even when they're running the same job. And, until somebody comes up with the truly universal cutting oil, you can't afford to disregard the importance of oil selection. Here's how Sun can help you.

First, Sun makes a complete line of emulsifying and straight cutting and grinding oils. Second, your Sun representative, backed up by field engineers, has the necessary practical experience to recommend the oil that will give you both high machining efficiency and low over-all costs.

For the full story about Sun's cutting oils, see your Sun representative...or write Sun Oil Company, Philadelphia 3, Pa., Dept. I-42.



INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL

#### REPORT TO MANAGEMENT

#### What's Wrong with Inventory?

A lot is being made these days of inventory buildup. Particularly in steel, inventory building is looked on as something dangerous, to be followed by serious buying cutbacks.

#### There is no rule of thumb

to back this up. Possibly the so-called recession of 1954, which was generally considered to be an inventory liquidating recession, is fresh in many businessmen's minds.

#### There's no reason to doubt

that automakers, appliance manufacturers and others are working on, or already have completed, buildup of their steel stocks. Every reasonably intelligent businessman knows there is a strong possibility of a steel strike and a certainty of higher steel prices. It would be foolish to ignore these factors in his planning.

#### It Isn't That Simple

The implication is that as soon as steel labor is settled, and steel prices are hiked, big consumers will drop out of the market, the steel operating rate will fall, and related segments of the economy will sag.

#### But there are contradictions

to that theory on every hand. First, there is no unanimity on the part of steel executives over inventory buying. Some deny it hotly.

#### And you may have noticed

that when a southern mill was closed recently by a wildcat strike, more than a few customers who relied heavily on the mill were forced quickly to the point of shutting down.

#### Generally, the auto industry

gets the finger pointed at it as the chief inventory builder, or steel hoarder. Again, there's no doubt that automakers are sitting on fat stocks of cold-rolled sheets and strip.

#### But automakers have learned

that being caught with too heavy steel supplies can be as costly. One of the Big Three, for example, learned the hard way in 1954 when it paid extensive storage charges, had to dispose of large tonnages through warehouses, and paid a heavy price for age hardening of stored coldrolled sheets.

#### And there's a lot to consider

besides steel and the auto industry. Others still haven't been able to balance their inventories, are crying for plates, structurals, and other scarce products.

#### No Letup Yet

You have never heard so much viewing with alarm with business so good. It's part of the business tradition to be a conservative forecaster, particularly among financial consultants and "Business Cycle" economists. But if it were not for some weaknesses in automotives, textiles, and farm implements, they wouldn't have much to stand on.

#### The first quarter shows the

gross national product ran at an annual rate of \$389.5 billion, \$1 billion higher than the rate in the last quarter of 1955.

#### The Office of Business Economy

of the Dept. of Commerce reports that purchases of new cars and houses "continued to decline," but that the sum of final purchases has "shown fairly steady growth."

#### Something To Think About on Housing

Housing starts are declining slightly from the rate a year ago (although the fact that construction contracts are setting new records is ignored by many forecasters).

#### But here again the long term

outlook is at its best. Don't forget that there are nearly 15 million veterans who have still not used their loan privileges, that these privileges will extend to 1965 for Korean veterans.

### INDUSTRIAL

Eye Opener . . . First automatic movie camera with an "electric eye" which automatically sets the lens for exposed movies has been introduced by Bell & Howell. New model 200-EE, a 16 mm magazine camera operates on the general principle of a human eye. A photo-electric cell, or electric eye, opens and closes the lens iris automatically to adjust to varying indoor and outdoor light intensities, solving the difficulty of determining the proper exposure.

That's Progress . . . Laclede-Christy Co., Division of H. K. Porter Co., Inc., has opened a new chemical laboratory which now supplements its facilities for physical testing and petrographic laboratories in providing data on raw materials and finished products.

At Your Service . . . Macwhyte Co., manufacturer of wire rope, has opened a new office and warehouse in Detroit, to provide for service with a large factory stock of wire rope.

Anything for Grace . . . General Electric Co. has received orders for propulsion turbines and gears and electric power generating equipment for use aboard two 300 passenger express liners. They will be constructed by the Newport News Shipbuilding and Dry Dock Co. for Grace Line, Inc. Costing approximately \$44 million, the luxury liners are scheduled to take their maiden voyages in 1958.

Action At Vegas . . . Headquarters for Republic Steel Kitchens in Clark County, Nev., is the General Supply Co., Las Vegas. Award of the Republic franchise to General Supply was announced by the general sales manager of Republic Steel Corp.'s Berger Division.

You-All... A titanium tetrachloride plant has been placed in operation by Columbia-Southern Chemical Corp. at Natrium, W. Va. Construction of the multimillion dollar facility was accomplished in less than 12 months. Annual production capacity is expected to be 35,000 tons. Titanium tetrachloride is used in the production of titanium sponge.



THOMAS M. FALLON, JR., appointed Pittsburgh regional business manager of The Iron Age. Mr. Fallon, a director of the Pittsburgh chapter, National Industrial Advertisers Assn., formerly was central district manager for Mechanical Engineering.

Strike Is No Ball . . . Despite the strike at 40 of its plants, Westinghouse Electric Corp., during the first quarter, shipped \$225.365 million worth of products and booked more orders than were booked in the first quarter of 1954, the third largest quarter in the company's history. Nevertheless, the strike resulted in a net loss of \$18.575 million, according to Westinghouse's president.

Electronic Shift . . . Fairbanks, Morse & Co., will move its Electronics Div. from Davenport, Iowa, to East Moline, Ill., because of the division's expanding sales and the need for greater manufacturing space.

Hot Stuff . . . S. P. Kinney Engineers, Inc., Carnegie, Pa., manufacturers of blast furnace and steel plant equipment, has been granted a license for the manufacture and sale of the Dango & Dienenthal Hot Blast Valve in the U. S. This valve, used in European countries, is being offered to the American blast furnace industry for use with automatic or manual stove changing systems. The valve is manufactured in sizes ranging from 12 to 54 in.

Service Station . . . Joseph T. Ryerson & Son, Inc., has purchased property in Indianapolis, Ind., as the site for a new steel service plant. It will cost approximately \$1 million for building and equipment, is scheduled for operation early in 1957.

Adds Aluminum ... The name of Reliance Steel Co., Los Angeles, has been changed to Reliance Steel & Aluminum Co. and the firm's magnesium division will operate as Reliance Magnesium Co.

Way Down Yonder . . . Woodward Iron Co., Birmingham, Ala., has purchased the Muscoda Div. iron ore mines from Tennessee Coal & Iron Div., U. S. Steel Corp. The purchase involved the T.C.I. No. 5 limestone mine and certain trackage rights over the T.C.I. railroad. The Muscoda ore mines have been closed for several months because imports of Venezuelan ore became too heavy to justify continued operation. Woodward president said they would be opened immediately.



## HOLES

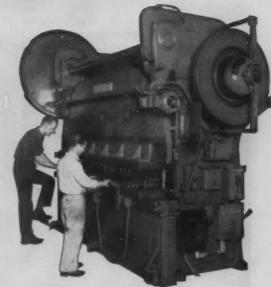
#### where they belong

Economical assembly depended on maintaining the accurate spacing of these 72 holes and their accurate positioning on this 10-gauge sheet.

This Cincinnati Press Brake is giving a high production at low cost by its speed and accuracy of performance, which insures rapid low cost assembly.

As a press, they offer high production with low investment. As a Press Brake, their low set-up costs, quick change-overs and versatility bring profits.

Write for Catalog B-4 where many examples of the versatility of Cincinnati Press Brakes are illustrated.





THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A.

SHAPERS . SHEARS . BRAKES



#### Studebaker-Packard Merger Likely

Continuing losses, difficulty in getting needed \$100 million loan make jointure with a non-auto producer the best solution . . . Tax loss write-off an advantage . . . Switch to one-car line seen—By T. L. Carry.

◆ THE LATEST report of the merger of Studebaker-Packard Corp. with a company not presently engaged in the automobile business is likely to delay any plans that are being made presently.

Mergers are delicate things. They involve a lot more than the mere joining of two companies. Each firm involved in the negotiations tries to come out on top and the jockeying for position can sometimes ruin the whole program.

Both parties try to please their own stockholders by getting as much as possible out of the deal. At the same time, when there are strong men at the head of each company involved, one of them either has to take a lesser job or bow out of the picture completely.

Who Will Bid?... Thus, the report that Studebaker-Packard was going to merge with Curtiss-Wright Corp. has been denied. But some sort of a merger for the S-P is definitely in the works. Here's why:

When Studebaker merged with Packard in 1954, the new company's assets were over \$250 million.

It was the intent at that time to make S-P a full line company in the automobile industry. This took a great deal of planning on the part of James J. Nance, president of the corporation, and it also cost a lot of money.

The program Mr. Nance adopted took 2 years to complete. It involved, among other things, modernization of manufacturing facilities, renegotiation of extremely costly labor contracts and development of a full line of autos.

Capital Dwindling . . . All of these things had to be accomplished before the company could actually concentrate on the distribution of its products.

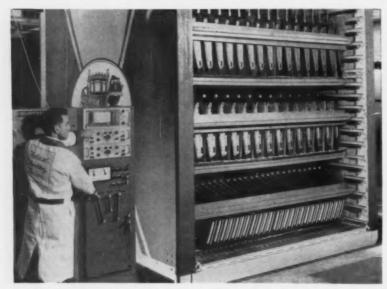
As a result, S-P steadily lost money until, in 1955, its losses were nearly \$30 million and its working capital had shrunk to a little over \$54 million.

At the beginning of this year, the company found itself in the position where it needed a loan of \$100 million. But bankers that were approached got cold feet. They looked at a shrinking automobile market, also noted the fact that General Motors Corp. was increasing its share of market penetration and then turned Studebaker-Packard down.

As a result, a finance committee was established with the idea of exploring every possibility in order to keep Studebaker-Packard in business. Mr. Nance, himself, tried to get more defense contracts to bolster the company's position.

Loans Denied . . . The finance committee, so far, has been unsuccessful in its efforts to negotiate a loan and defense contracts take time to negotiate.

This leaves only one other pos-



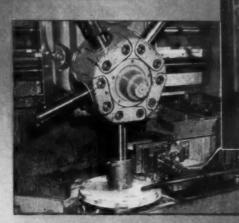
FISHER Body Div., General Motors uses this exact replica of a section of a freight car, with a vibrating unit, to simulate transportation bumps and jars, Object is to develop improved, more effective packaging.



#### DRW.T.L.

reduction in machining time

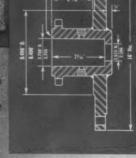
Manufacturers of fluid mixing equipment for numerous applications in industry, Mixing Equipment Co., Inc., Rochester, New York, are enthusiastic in their acclaim of the performance of their new 26" Cut Master, Model 75.



Easier loading and chucking, greater capacity and accuracy, combined with ease of operation are the factors contributing to the increase in production according to Mr. Walter Schmidt, General Foreman.

#### 10 ÷ 0 > BULLARD COMPANY

BRIDGEPORT CONNECTICUT Are you interested in applying these advantages to your manufacturing processes? If so, call you nearest Bullard Representative or mail



#### THE BULLARD COMPANY

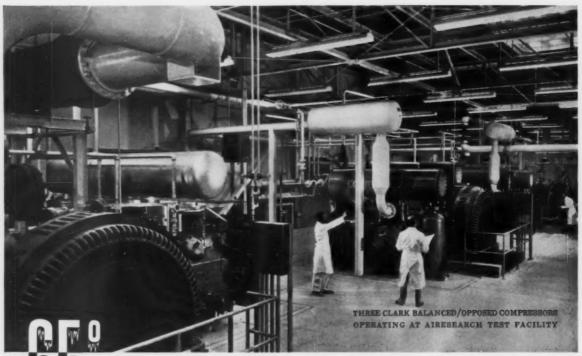
286 CANFIELD AVENUE - BRIDGEPORT 9, CONNECTICUT Please send me a copy of the NEW CUT MASTER V.T.L., MODEL 75 CATALOG

NAME COMPANY POSITION

ADDRESS CITY

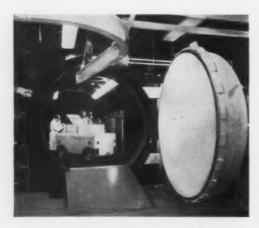
STATE

ZONE



## below zero in the middle of the desert

#### Clark Air Compressors furnish the power



GIANT ALTITUDE CHAMBER FOR HOT AND COLD TESTS

Mass production testing of aircraft components such as air turbine starters, refrigeration turbines and other units was what the AiResearch Division of the Garrett Corporation wanted. To meet this need, they built giant test facilities next to their factory in the middle of the Arizona desert at Phoenix featuring seventy-five test cells.

To provide most of the air to operate test equipment AiResearch installed three Clark Model CRA-4 Balanced/Opposed Motor-Driven-Compressors having a combined rating of 4750 horsepower. Up to 42 tons of air per hour can be delivered. Temperatures range from a frigid  $-65^{\circ}$  to a blistering  $1000^{\circ}$ F while pressures of from vacuum to 1000 psi can be provided.

For your air needs in the 150-4500 horsepower range, Clark has an ultra modern Balanced/Opposed Compressor to fit every application. Your nearest Clark representative will give you complete information or write for Bulletin 118.

#### CLARK BROS. CO., OLEAN, N. Y.

One of the Dresser Industries
Offices in Principal Cities Throughout the World



#### **Automotive Production**

(U. S. and Canada Combined)

				,,
WEEK	EN	DING	CARS	TRUCKS
MAY	12,	1956	121,961	25,421
MAY	5,	1956	123,339	25,338
MAY	14,	1955	187,956	33,790
MAY,	7.	1955	182,864	32,892

\*Estimated. Source: Ward's Reports

sibility—a merger. And the committee is exploring this field at the present time. The committee has been talking with firms both in and out of the auto industry . . . has been most successful with those companies not engaged in auto production.

A merger with a profitable nonautomotive firm would have definite advantages for the company involved. In addition to acquiring the physical assets of S-P, the new firm could also take advantage of a tax loss write-off in excess of \$50 million.

Insiders in Detroit say that any merger would involve at least four major points:

(1) Automobile assembly would be concentrated at the Studebaker Div. plants in South Bend, Ind.

(2) Workers in Detroit, not employed at Packard's engine plant in nearby Utica, Mich., would switch over to defense production.

(3) The Connor plant, which was leased from Chrysler Corp., would be vacated.

(4) Mr. Nance would resign after the merger is completed.

One Car Likely . . . It is also likely that once a merger is completed the new company would reduce the number of cars it makes and concentrate more on one line.

This method has proved successful for American Motors Corp. with its production of the Rambler.

Mr. Nance's program to make S-P a full line company was successful up to the point of distribution. So it is logical to assume that any new company will realize that from a distribution standpoint it cannot challenge the Big Three across the board but will be better off with one car.

Help Coming . . . S-P is expected to get at least a chunk of a sizable truck building contract to be awarded soon by the Army.

Congressional and government officials have been pressing the Pentagon to funnel contracts to the faltering small auto manufacturers to help them ride out a current slow-down in sales. Defense appropriation laws permit use of negotiated contracts and less-thanlow bidders when it would help ease unemployment.

Army truck contract for which Studebaker is a candidate will run between \$20 million and \$25 million in total.

#### Chevrolet Ahead

Chevrolet is continuing to hold on to first place in auto registrations. First quarter figures just released by the GM division show that Chevrolet sold 362,103 cars from January to March.

Thus the division's lead over Ford reached 64,120. Chevrolet also set a new record. Sales exceeded the best previous first quarter in 1951 by 48,604 units.

In addition, the division has just announced plans to expand its plant in Janesville, Wis.

#### AUTOMOTIVE NEWS

When the expansion is completed next year, the plant will be able to produce 1000 cars a day on a 2-shift basis compared to the present 880.

A similar expansion of Fisher Body facilities in Janesville will permit the manufacture of station wagon bodies.

#### Suppliers Soothed

Rumblings of automobile dealer discontent with the industry are starting to carry over into another field. Parts suppliers and other vendors are trying to improve their position with relation to the manufacturers. As a result, the Ford Motor Co. has opened an exhibit at its Rotunda in nearby Dearborn with the idea in mind of improving its supplier relations.

The exhibit, called Partners in Production, shows the techniques involved in manufacturing automobiles.

Fifty-two suppliers are participating in the exhibit.

#### THE BULL OF THE WOODS

By J. R. Williams



#### For Quickest Action in Cutting Metal and Costs

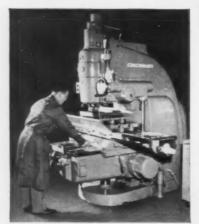
## NEW

## CINCINNATI HIGH POWER and DUAL POWER DIAL TYPE MILLING MACHINES

Primarily, you're cutting costs when you step up cubic removal of metal. And you have plenty of opportunity to remove metal as rapidly as the work and fixture will permit when you assign the job to a new Cincinnati® High Power or Dual Power Dial Type Milling Machine. These new knee types are tops in cutting capacity; tops in easy, convenient operator control; tops in low maintenance expenses. You'll be interested in the "vital statistics" shown in the table below. ¶Cost-reducing possibilities of the High Power and Dual Power Dial Types include 24 spindle speeds . . . 32 feeds (% to 90 ipm) . . . full power to the spindle with independent feed drive motor . . . single lever, power selection of speeds and feeds. Horizontal machines are equipped with Dynapoise overarms to reduce self-excited chatter . . . plain and vertical machines are equipped with automatic table cycles. Write for new catalog No. M-1917-1; or look in Sweet's for brief data.

THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO





Power draw-bar attachment reduces the cost of this 12-operation job on No. 4 Vertical



A high cubic removal job (1½" depth of cut, 19 ipm feed) . . . milling the sides of heavy machine tool part on a new CINCINNATI® No. 5 Plain Dual Power Dial Type Milling Machine.

Sizes	No. 3	No. 4	No. 5	No. 6	
Styles	Plain Univ. Vert.	Plain Univ. Vert.	Plain *Univ. Vert.	Plain Vert.	
Table travel	34"	42"	50"	60"	
Motor drives: Spindle (H.P.) (D.P.)	1	25 hp 50 hp	25 hp 50 hp	25 hp 50 hp	

\*No. 5 Universal available in High Power Machine only

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#### Hard Money Policies May Be Scrapped

Despite split in cabinet, lke leans toward easing credit policies . . . Sec. Humphrey wants to stop meddling with interest rates and credit . . . Inflation threat still bothers some—By G. H. Baker.

◆ HARD-TO-GET credit soon will have run its course. The Eisenhower Administration's economic experts are preparing to ease up on their "hard money" policy before long. By next month, you can expect the government to re-open the door to easier credit. It's part of a calculated plan to stimulate consumer buying and to keep the U. S. economy spinning at a lively pace by Election Day.

It's no secret in Washington that the Eisenhower Cabinet is split sharply over the current "hard money" policy. Ike says he agrees with William M. Martin, the chairman of the Federal Reserve Board, that the recent tightening in interest rates was needed. Things were getting out of hand, according to Mr. Martin's charts.

Humphrey Dissents . . . But Treasury Secretary George M. Humphrey says nonsense, the volume of loans ontstanding is nothing to get excited about. Besides, he adds, the government ought to back away from the notion that it has to keep tinkering with interest rates and with credit. Let 'em alone, says Mr. Humphrey.

Regardless of who is right, the current state of "hard money" is to last only a few more weeks. There are several reasons for this. The main reason is that nobody in the Eisenhower Cabinet has the slightest intention of permitting a "hard money" policy to hatch the eggs of a recession between now and the November elections.

Fighting Words . . . Another point: The Administration is keen-

ly aware that the current state of business prosperity is not general—either geographically or by type of industry. Example: Talk of a "boom" is a sarcastic joke in many areas of Kentucky, Pennsylvania, and in West Virginia. And there are a number of industries in which production and sales are "off" this year. This list includes automotive textiles, apparel, furniture, lumber, and wood products. These industries are bogged down in moderate depressions.

Ike's business experts are selfconscious about these weak spots, and vow they'll inject new life into them before long. Various possible methods of accomplishing this are currently under extensive study. Eye on Income . . . Government money managers are keeping a close watch on rising personal income figures with a little glee and a little apprehension—the more people make the more they can buy, but too rapid a rise will put even more inflationary pressure on the economy.

In March, personal income was running at an annual rate of \$3.5 billion, a hefty \$1.5 billion higher than the previous month. Wage and salary payments alone went up by an annual rate of \$1 billion during the month, about evenly divided between manufacturing and nonmanufacturing.

Major factor in the increasing income in March, according to the

#### What's Happened to the Hoover Commission?

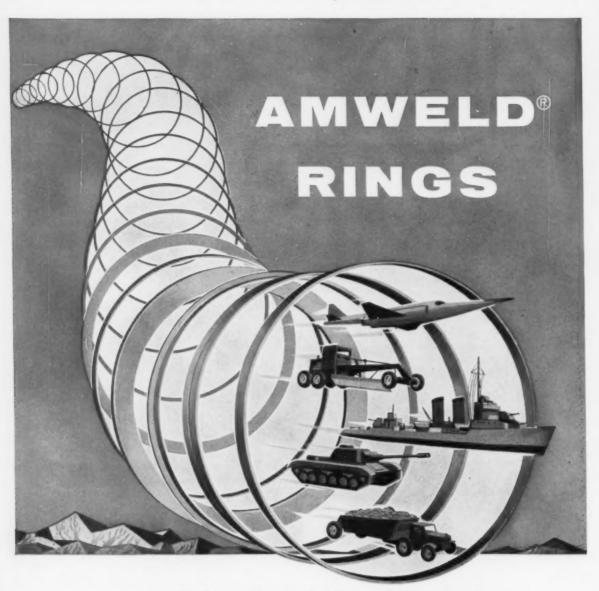
#### Adopted-

The executive branch has brought about adoption of 18 pct of the proposals and legislative action another 4 pct. Changes made will save government \$470 million annually.

#### In the Works-

Newest major improvement will be establishment of business-type cost accounting methods in all government branches. To supervise the new system, a larger staff will be needed at Budget Bureau, which plans to ask Congress for \$400,000 more to cover costs.

- In new system, funds are to be handled on a cost-accounting, accrual basis to permit use of a performance budget, rather than one based on future obligations.
- Changeover may save millions of dollars. Departments and Congress will be able to follow more closely appropriations and actual spending.



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any circular weldment problem you might have. The manufacture of circular weldments—rings, bands and components—has been an American Welding specialty since 1918.

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In 1949, Amweld was the first to successfully weld titanium alloy on a production basis.

If you need rings or circular components of ferrous or non-ferrous metal, from 6 to 96 inches in diameter, contact the Industrial Products Division of

AMERICAN WELDING U. S. Commerce Dept. Office of Business Economics, was the increase in the minimum wage from 75¢ to \$1.00 an hour.

Remainder of the increase came from dividend and interest receipts; net income of proprietorships and partnerships and net rents by landlords.

#### **GOP Congress?**

Republican doorbell-ringers are being advised that the job of electing a Republican-controlled Congress this November will be rugged, but not impossible.

President Eisenhower's name on the ballots does not necessarily guarantee that he will carry a Republican majority in the Congress along with him.

A two-day Washington meeting on Republican strategy hammered away at the theme that "you can't take anything for granted in politics."

#### Seats in Danger

There is a good chance that Republicans can wrest 94 House seats from the Democrats now holding them, leaders predicted. Of these, 31 were won by Democrats in 1954 by hairline margins. In 63 others, Ike is rated as a winner.

In the Senate, Republican leaders think they can take over at least "several" of the nine seats up for re-election now held by Democrats. Republicans need to hold all they've got and pick up two more seats to win a majority in the Senate.

#### Missile Muscle

The next big procurement program related to air defense will be concerned with an anti-missile missile.

High-ranking Army missile experts are now confident that they can nullify all attempts by an enemy to bomb the U. S. from manned aircraft. Problem now is to perfect experimental models of missiles that will intercept and destroy incoming enemy missiles.

The new missile will be one of the Nike family, evidently. It's a tough problem, but Army research scientists say they are confident they are now on the track of new weapons that can meet and destroy both ICBMs (intercontinental ballistic missiles) and IRBMs (intermediate range ballistic missiles).

#### **New AEC Rules**

Security standards of the Atomic Energy Commission are revised and updated in an action that will affect contractors and licensees with the AEC, holders of access permits, and new and present employees of the agency.

Changes are made in the rules applying to hearing boards which will develop all information relating to a person's eligibility for security clearance. New standards are set up to permit reconsideration of cases where clearance has been granted or denied earlier.

An AEC committee formed in 1955 recommended revisions in the security rules. Eligibility standards were last previously revised in 1950.

#### Atom Budget:

lke asks \$282.6 million for AEC installations

Atomic Energy Commission will get \$282.6 million for new plant and equipment buying during the coming fiscal year if Congress heeds President Eisenhower's new

#### WASHINGTON NEWS

request for money for the agency.

He wants Congress to appropriate \$144.2 million in new funds which would be added to \$138.4 million from funds voted earlier. The President recently signed a bill authorizing almost \$295.5 million for the AEC plant and equipment program, but part of the funds would be spent after fiscal 1957.

#### Where It Goes

Breakdown of the proposed spending of plant and equipment money in the year beginning July 1 shows the following pattern: \$57 million for improvements and additions to present production plants; \$65.2 million for additional facilities to turn out weapons; \$96.9 million for plants needed in military propulsion reactor projects; \$12.3 million to improve research laboratories and build new ones; and more than \$51 million for miscellaneous purposes.

A separate authorization is requested to cover AEC operating expenses. Funds asked for in the proposed budget amount to approximately \$1.7 billion to meet these expenses.

The requests for cash show mounting costs of the atomic age.

#### **Constructive Role Planned for Missiles**

Eventual chores to be assigned the guided missile won't all be destructive. Army planners intend to use them as a fast-travelling supply vehicle to carry ammunition, food, fuel and medicine to remote units.

Problems that could be solved in part by the flying carriers involve operations in the Arctic and in foreign territory where fringe wars might occur.

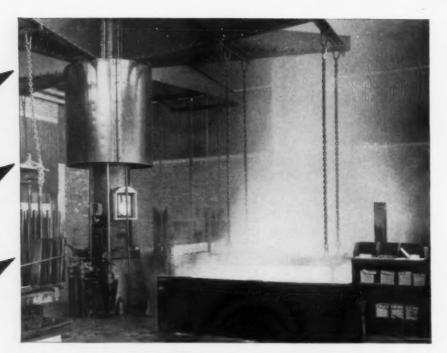
Maintenance of highly expensive advance bases in the Arctic might be held to a minimum if missiles were built to carry several tons of needed materials each. Missile flights could supply guerrillas in times of war.

Only catch: How do they get down safely?

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#### Farwest Steelmakers See Record Year

Construction boom setting the pace... Steel mills expected to show 10 pct production increase if labor situation remains peaceful and equipment holds up under heavy load—By R. R. Kay.

◆ FOUR MILLION tons of finished steel in 1956! This all-time Farwestern production record is now in the making.

By year-end, mills here will rack up a 10 pct hike over previous highs. And every major product group will turn up with a plus sign. You can put your money on it—if there's no labor trouble and if equipment holds up under the terrific strain.

What's more, mills will do it without benefit of added capacity. How? By improved efficiency.

Major pace setter: construction. The Farwest simply can't build fast enough to keep up with the people's need for homes, schools, factories, office buildings, dams, bridges, and highways.

And that's why it's a sure thing for: 25 pct more structural shapes than last year; 19 pct more standard and line pipe; 6 pct more reinforcing bars; 4 pct more plates. (See table.)

THE IRON AGE's annual survey and analysis put its finger on the reasons for the industry's heady optimism.

Plates . . . Mills hope to push out 25,000 tons more than last year. But it won't help much. Plates will be tight right through year-end. General fabrication's at a very high level, and line pipe people are working at fever pitch.

Hot and Cold Rolled Strip . . . Automotive suppliers, keeping up with bustling assembly plants here, will jack these up for a four per cent increase. They use a lot of hot-rolled strip for wheels and cold-rolled for small stampings.

Hot and Cold-Rolled Sheets and Tinplate . . . Demand keeps growing. Farmers here look for a second consecutive record crop year. The added five per cent won't change the overall picture much: the area will still have to bring in about half its needs. (See THE IRON AGE, West Coast Report, Apr. 19, 1956, p 81.)

Hot and cold-rolled sheet production will be strong right through the year.

Standard and Line Pipe . . . Pacific Northwest pipelines will flow natural gas to the area in the fall. This plays a heavy part in the 19-pct, 83,000-ton increase. Mills look for continuing hefty large-diameter line pipe orders, and increasing business in

medium diameters for several years. This marks a big change. Only a few years ago, a good piece of the local production was shipped out of the area. Today, almost every ton is used right here.

Structural Shapes . . . Mills plan for 78,000 tons more than 1955—up 25 pct! It's due to the big commercial building boom, something that's sure to stay with Farwestern states for quite a few years.

Reinforcing Bars, Bars and Small Shapes . . . Keep an eye on these. They're beliwether products in this market. It'll be a feather in their cap if the mills can sell the more-than-one-million tons they plan to make.

#### Farwestern Finished Steel Output

(In Net Tons)	(F	or Seven	Farwestern	States*)					
			Pct Change						
	1954	1955	1956**	1955-56					
Plates, sheared and universal	557,589 47,198 915,125 302,368 237,544 392,341	569,134 60,480 1,054,977 434,262 310,695 516,244	594,000 63,100 1,109,000 518,000 388,000 549,500	+ 4 + 4 + 5 + 19 + 25 + 6					
Hot- and Cold-Rolled Strip									
Hot- and Cold-Rolled Sheets and Tinplate Standard and Line Pipe Structural Shapes Reinforcing Bars									
					Other Bars and Small Shapes under 3 in.	364,857	463,199	498,400	+ 8
					Wire Products and Wire Rods for Sale	170,705	234,213	241,000	+ 3
					TOTAL: (Rolled Products)	2,987,727	3,643,204	3,961,000	+ 9
Ingots, Blooms & Billets for Sale	44,680	23,434	15,200	-35					
Miscellaneous	23,438	28,159	34,300	+22					

\* California, Oregon, Washington, Idaho, Utah, Nevada, Arizona

\*\* Estimate





MACHINE TOOL HIGH SPOTS

#### Congress Dooms Reserve Tool Fund

Frugal armed forces spending for mothball machinery during 1955, 1956 seen as cause . . . Lawmakers take back unspent money and are expected to withhold new funds . . . Senate fight looms—By E. J. Egan, Jr.

• SPECIAL FUNDS to cover purchases of reserve machine tools may be withheld from military appropriations for the new fiscal year that begins July 1. Congress' patience is growing short because of the armed forces' failure to spend money previously voted.

House Appropriations Committee approved \$33.6 billion of a proposed Defense Dept. budget for fiscal 1957. But it turned down a \$100 million request for reserve tools and facilities. The request was not for new money, either. The Pentagon was simply asking lawmakers to continue the unexpended \$100 million in tool funds which were appropriated for fiscal 1956.

Funds Unspent... As the Committee points out, the armed forces were given \$100 million with which to buy reserve tools in fiscal 1955. Because the money could not be spent for equipment to go into current production lines, only about \$16 million was used for items to go into mothballs.

Thus the three services have had \$200 million at their disposal for the past two fiscal years, but they've spent only \$16 million, approximately.

Viewing this record, the Committee finds it logical to let the 1956 appropriation expire on June 30. Moreover, it doesn't want to vote new funds, even in a lesser amount, for reserve machine tools.

Hassle Looms . . . If this decision to withhold any new money really sticks, it could touch off a

fight when the Defense Dept. budget comes up for Senate approval. Sen. Sparkman, D., Ala., says he will urge restoration of the item earmarked for reserve metalworking equipment. In fact, he advocates greater investment in special tools.

Fuss about reserve equipment seems a bit ridiculous in view of the Pentagon's much-publicized decision to abandon the Vance Plan and switch to a program of buying tools for current use out of general military appropriations. Guess is that as long as there was a possible extra \$100 million to be had for the asking, the Defense Dept. would swallow its pride and make the request.

#### **New Tool Display**

Nineteen machine tools under power and a display of 178 new industrial products that the firm has introduced in the past nine months were revealed last week at the opening of Precision Center, a modern demonstration area inside the Brown & Sharpe Mfg. Co. plant, Providence, R. I.

Establishment of this new training and showroom facility gives the company an excellent place to educate B & S personnel and distributors. Intention is to put it to almost constant use for classes and informal conferences pertaining to the design, sale, use and maintenance of the firm's products.



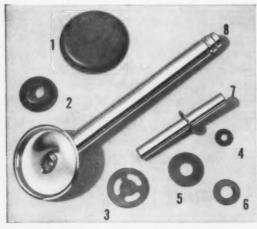
THIS knee-type universal milling machine is just one of 19 machine tools standing powered and ready for demonstration at Brown & Sharpe's new Precision Center. Area will serve as a showroom and training facility.

#### BRIDGEPORT BRASS COMPANY

### COPPER ALLOY BULLETIN

Bridgeport

Reporting new developments in copper-base alloys and metalworking methods.





#### Manufacturer Finds Technical Service Helps Match Metal to Process and Product

Dishcloth and dishpan may soon become museum relies through continuing advances in the plumbing equipment field. A good example of this progress is the Dish-Quick® detergent dishwashing spray developed by Modern Faucet Mfg. Co. of Los Angeles, makers of plastic and die-cast plumbing specialties.

Their semi-automatic dishwasher (illustrated above) makes it possible to soap, scrub and rinse dishes in half the usual time. Operation and installation of the spray are simple. Press the button and lever simultaneously for rich suds, and follow by pressing just the lever for a clear spray of hot rinse water. Old style trigger sprays can be easily replaced in a few minutes.

Because of the variety of materials needed and the different manufacturing processes involved, Modern Faucet Mfg. Co. asked Bridgeport's metallurgists to help determine exact material specifications for each component of the dishwasher. The manufacturer needed tube that would be easy to polish and plate; brass rod that was free-machining to reduce machine time costs; and brass strip with easy formability.

In addition to meeting the special metalworking requirements of screw machines, eyelet machines, punch presses and induction welding machines, each alloy had to resist corrosion and give quality performance for long product life.

The illustration shows components produced from alloys recommended by Bridgeport Technical Service.

The Spray Face (1) is stamped from 85/15 Red Brass Strip, Bridgeport Alloy F85, as are the Water Valve Packing Retainer (2), Seat Washer Support Disc (3), and Detergent Valve Packing Retainer (4). Also known as Rich Low Brass because of its low zinc content and rich golden color, Alloy F85 was recommended because of its high strength, fine ductility, and resistance to cracking and corrosion. All external parts are chrome plated for durable, lasting beauty.

Tubing (8), which is silver brazed to the Spray Face; Rear Packing Guide (5); and Washer (6) which is silver brazed to Valve Tube (7) are Alloy F37, a 70/30 yellow brass alloy with great strength, a good polishing and plating surface, and high corrosion resistance.

While this article concerns the material selection requirements of one particular manufacturer, the knowledge and skill of Bridgeport metallurgists is also available to you. Bridgeport Technical Service is as near as your typewriter or your telephone. Write direct to our home office or phone your nearest Bridgeport Sales Office.

More Profitable Cold Heading with Bridgeport Alloys



Successful cold heading depends on metal, temper and tooling. If any one component varies, the other two are affected to a great extent. For this reason, Bridgeport metallurgists have made a special study of the problem of choosing the right metal for use in cold heading. The alloy should be matched to the type of part being manufactured and to the tooling. It must have good strength, malleability and correct temper—all essentials for high speed automatic operation.

The temper of the alloy stock is generally determined by the amount of cold working involved and the temper required in the finished part. In the case of Silicon Bronze, Bridgeport Alloy #609, the wire is supplied in the hard-drawn condition, since it is extremely ductile in all tempers, and resists corrosion and stress corrosion cracking. This alloy is finding ever widening applications for outdoor construction where brass and steel are not desirable.

High Brass, Bridgeport Alloy #16 is still the favorite cold-heading wire alloy because of its excellent working properties and its durability as a finished article. It is ideal for all types of machine, wood and cap screws, solid and hollow rivets and special fastenings.

When you are selecting an alloy, remember it costs you nothing to ask your Bridgeport Sales Office for expert metallurgical advice. They will be glad to study your requirements, and recommend a metal that is matched to your job. Call or write for further information on Bridgeport alloys for cold heading.

(4624)



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#### The Iron Age

#### SALUTES

Carl J. Snyder From toolmaker's apprentice to Chrysler Corp. executive, his talents could have taken him just as far in a number of professions.

Few can match his automotive tooling know-how.

Carl J. Snyder, Chrysler Corp.'s trouble-shooting vice president and operations manager, could easily have made a career of aviation, horse breeding or even piano playing. Fortunately for the automotive industry, he selected toolmaking as his field, rising from an apprentice boy to his present position with Chrysler.

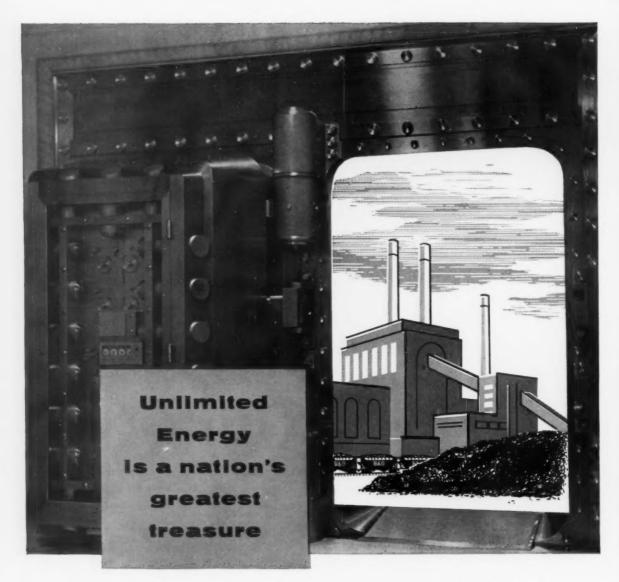
Blessed with a superabundance of energy, Mr. Snyder is characterized by a warm, friendly nature, an ever-burning cigar and a penchant for coming up with the right solution at the right time. A native of York, Pa., he moved to Detroit in his youth, joining Maxwell—predecessor to Chrysler Corp.—in 1921.

As an early associate of Walter P. Chrysler, Mr. Snyder's rise in Chrysler Corp. was rapid. His titles ranged from master mechanic to general manager before he was named vice president in 1952. During World War II, he served as master mechanic for Chrysler's atomic bomb activity in connection with the Manhattan Project and at Dodge's Chicago plant.

He is always willing to try something new, his associates point out. For example, in the early days of aviation he took an active interest in flying and for many years held a pilot's license. Last year, two major airlines awarded him plaques for his "many contributions to the development of air transportation."

This pioneering spirit has helped him overcome many planning problems, earning for him a reputation as a top tooling expert. The huge Chrysler stamping plant at Twinsburg, O., is his latest project.

Formerly, he was a fancier of show horses and currently takes great pride in his two prizewinning boxer dogs, Pat and Jeff. His talents extend into the field of music, too. An accomplished piano player and organist, on many an evening he sits down to a parlor recital of modern music with Mrs. Snyder as his audience. If fate hadn't saved him for the auto industry, Carl Snyder might well have been another Jose Iturbi, a Glenn L. Martin, or perhaps a Jock Whitney.



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#### The Iron Age INTRODUCES

Robert C. Tyson, elected chairman, Finance Committee, U. S. Steel Corp., succeeding Enders M. Voorhees, retired. Mr. Voorhees continues as a director, member of the Finance Committee, and consultant. Clifford F. Hood, president, U. S. Steel, was elected chairman of the Executive Committee. Executive Advisory Committee is discontinued, and Benjamin F. Fairless, former chairman, Executive Advisory Committee, continues as consultant and will serve as special advisor to the Board of Directors.

Edward L. Ladd, elected president, United Aircraft Products, Inc., Dayton, O.

James B. Black, Jr., elected assistant vice president, sales, Coumbia-Geneva Div., U. S. Steel Corp., San Francisco; Ralph T. Mitchell, named manager, sales, Denver.

Patrick J. B. Crowley, named administrative assistant to executive vice president, dealer relations, General Motors Corp., Detroit.

Harold E. Taylor, named superintendent, Coke and Chemical Dept., Alan Wood Steel Co., Conshohocken, Pa.

John E. Thompson, Jr., appointed assistant general superintendent, Gary Sheet and Tin Mill, U. S. Steel Corp., Gary, Ind.

Andrew L. Kozak, named superintendent, manufacturing, Gas Turbine Dept., General Electric Co., Schenectady, N. Y.

Dr. Irving Roberts, appointed director, planning, Reynolds Metals Co., Richmond, Va.

Paul W. Coffman, appointed superintendent, Cold Mill Div., Acme Steel Co., Chicago.

Harry J. Draine, named superintendent, Blast Furnace Dept., South Chicago Works, The Youngstown Sheet and Tube Co., East Chicago, Ind.

R. B. Scott, named general assistant to assistant executive vice president, accounting, U. S. Steel Corp., Pittsburgh; W. C. Cramer, Jr., named manager, general accounting; L. R. Gahring, named manager, consolidated and financial accounting.

John B. Henry, Jr., named product manager, high temperature metals and valve steels, Allegheny Ludlum Steel Corp., Pittsburgh; George C. Kiefer, named manager, application development.

Willard Danner, named manager, Eastern sales, Armco Steel Corp., Middletown, O.; Sidney Yager, named Chicago district sales manager.

Robert C. Gilmore, appointed assistant to comptroller, Associated Spring Corp., Bristol, Conn.

#### PERSONNEL



CARL L. HUFF, elected chairman of the board and chief executive officer, Bliss & Laughlin, Inc., Harvey, Ill.



ARTHUR LEHR, elected president, Bliss & Laughlin, Inc., Harvey, 111.



J. STANLEY McCORD, elected vice president, Eastern Operations, Bliss & Laughlin, Inc., Harvey, Ill.



OSCAR L. BARD, elected chairman of the board, Michigan Tool Co., Detroit.





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132 WEST 22ND STREET NEW YORK 11, N. Y. R. E. Sheffer, named manager, Aluminum Co. of America, New Kensington, Pa., Works.

Morris W. Jones, named general manager, Sargeant & Wilbur, Inc., Pawtucket, R. I.

Floyd L. Poirier, appointed traffic manager, Basic Refractories Plant, Kaiser Aluminum & Chemical Corp., Columbiana, O.

Frank Delaplane, appointed plant manager, forging plant, Kaiser Aluminum & Chemical Corp., Erie, Pa.; John E. Dullahan, appointed marine traffic analyst, Oakland, Calif.

William O. Nussear, Jr., appointed marketing manager, Superior Tube Co., Norristown, Pa.

J. R. Stein, appointed project manager, construction and developing, Louisiana Div., Dow Chemical Co., Midland, Mich.

Glenn T. McMillan, named manager, Chevrolet Motor Div., General Motors Corp., Bloomfield Assembly Plant.

Jack E. Fathauer, named sales manager, Railway Div., Cleveland district office, National Malleable and Steel Castings Co.

John S. Macdonald, appointed general manager, Distribution Assemblies Dept., General Electric Co., Plainville, Conn.

Anthony J. Pelson, named assistant sales manager, distributor sales, Continental Screw Co., New Bedford, Mass.

John G. Frischkorn, appointed district sales manager, Cleveland Tramrail Div., The Cleveland Crane & Engineering Co., Wickliffe, O.

William F. Schlick, named sales manager, Western region, Sterling Grinding Wheel Co., Tiffin, O.; James L. Goodwin, named sales manager, Eastern region.



MARVIN R. ANDERSON, elected president, Michigan Tool Co., Detroit.



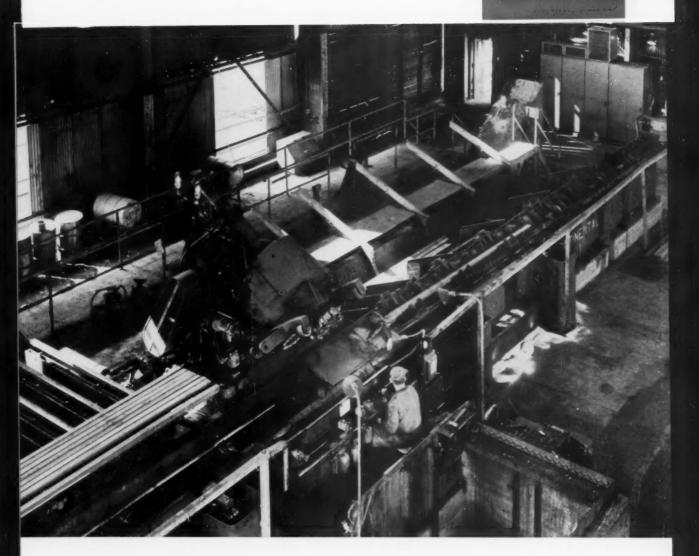
J. FREDERICK BECHTEL, elected vice president, Clark Equipment Co.



CLAUD A. FENN, elected vice president, Clark Equipment Co.



JOHN R. WOOD, JR., elected vice president, Clark Equipment Co.



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are removed. The Continental Chipper accommodates billets up to 30 feet in all merchant and bar mill sizes,

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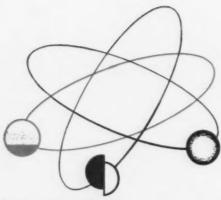


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Archie J. McDonell, named manager, Sunbright Plant, Foote Mineral Co.

Wyn McCoy, named sales promotion manager, Industrial Div., The Timken Roller Bearing Co., Canton, O.

Frank E. Stehlik, appointed general manager, Low Voltage Switchgear Dept., General Electric Co., Philadelphia.

Robert R. Freeman, named manager, arc-cast molybdenum development, Climax Molybdenum Co., New York.

Robert M. Simpson, named manager, Los Angeles sales branch, Crucible Steel Co. of America, Pittsburgh.

Carl J. Siebert, appointed sales manager, W-S Fittings Div., H. K. Porter Co., Inc., Roselle, N. J.

James McCracken, named assistant district sales manager, Detroit office, The Ferry Cap and Set Screw Co., Cleveland.

Henry C. Miller, appointed machine tool sales manager, Axelson Div., U. S. Industries, Inc.

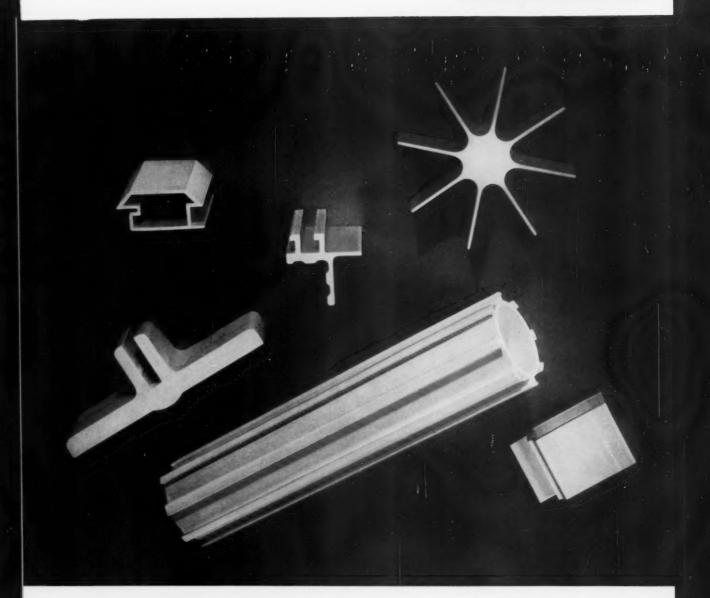
#### OBITUARIES

Albert J. Grother, 52, vice president and general manager, Iowa-Nebraska Div., Armco Drainage & Metal Products, Inc., Middletown, Ohio.

Donald J. Phillips, 50, sales manager, Austin-Western Works, Construction Equipment Div., Baldwin - Lima - Hamilton Corp., Aurora, Ill.

Nels E. Flodin, 55, manager, Latrobe plant, Alco Products, Inc., Latrobe, Pa.

Henry J. Freyn, retired president and chairman of the board, Freyn Engineering Co., now a division of Koppers Co., Inc., Pittsburgh.



## These Extrusions are made of Aluminum

... and Men!

When you order aluminum extrusions from Michael Flynn, we put our years of metal-working experience to work for you . . . the skill of engineers and metallurgists who know metals and design.

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Every operation, from casting the aluminum billets to final inspection, is under rigid control to maintain quality and keep costs down.

Strategically located in the heart of Delaware Valley, U.S.A. Stock dies available for most standard profiles. Estimates furnished promptly. Call or write us today.

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## THE SHOT OF LEAD THAT STARTED A REVOLUTION!



SECRET OF INLAND PATENTED LEDLOY' PROC-ESS is this precisely controlled "shot" of lead pellets gunned into molten steel as the ingot is poured.

## Leaded steels are re-writing the book on machinability. They go by a variety of trade names . . . but all are made by the patented Ledloy\* process developed by Inland Steel.

In 1939, Inland metallurgists working with others engaged in the field of free-machining steel research, developed a new steel that behaved like brass under a cutting tool, yet it had the strength and other properties of high quality open hearth steel.

The secret lies in the method of dispersing an almost infinitesimal amount of lead particles (less than ½ of 1%) throughout the molten ingot as it is poured. Dispersal is so uniform there is no alteration of the steel's basic qualities. Yet this tiny "shot" of lead does amazing

things to the steel's machinability. As Ledloy has become more generally available, one case history after another has documented the production increases and lowered costs it makes possible.

Leaded steels are now made under Inland licenses by a number of manufacturers. But whether the leaded steel you use is called Ledloy or any other trade name, it is made by the patented, closely controlled process that makes the Ledloy family truly the "world's most machinable steels".

#### Ledloy gives the ultimate performance for which your modern machines were designed.

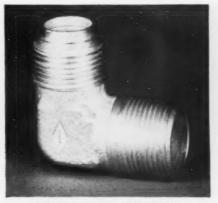
The fact that Ledloy can be machined at extremely high speeds (up to 45% faster than B-1113 in some cases) is only one reason for its increased productivity. The lead particles in Ledloy actually lubricate the cutting tool during machining. Also Ledloy chips break up into

shorter lengths which quickly fall free of the tool, again reducing heat and friction.

Result: greatly increased tool life and less down-time. Production increases of 50% or more are not unusual, yet qualities of open hearth steel are retained.



REJECTS PRACTICALLY ELIM-INATED on this heat control element when Ledloy replaced non-leaded steels. Machining speed increased 42.5%, tool life was prolonged with drop in machine down-time.



MACHINABILITY STEPPED-UP 27% on this forged fitting when manufacturer switched to hot rolled Ledloy Grade A. Just one of many phenomenal case stories reported by producers of machined forgings.



15,000 HOLES must be drilled in this steam condenser baffle plate. Changing from non-leaded steel to Ledloy cut drill and ream time, resulted in truer, smoother holes, with no sacrifice in strength or other properties.

If you make screw machine products or machined forgings, or if your product requires drilling or machining it will pay you to get all the facts about Ledloy. Ask your cold drawer or jobber. Or write for our interesting booklet on "Properties of Leaded Steels".

\*registered trade name of Inland Steel Company, leaders in the development of leaded steels.

#### INLAND STEEL COMPANY

38 South Dearborn Street • Chicago 3, Illinois Sales Offices: Chicago • Milwaukee • St. Paul • Davenport St. Louis • Kansas City • Indianapolis • Detroit • New York



#### IF YOU BUY OR SPECIFY SPRING STEEL

This Free Book Belongs On Your Desk



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SANDVIK COROMANT DIVISION ° Fair Lawn, N. J. \* Carbide Tools
Works: Sandviken, Sweden ° Hellefors, Sweden

The booklet also includes such useful reference tables as Weights of Strip Steel, Comparative Table of Wire Gauges, Numerical Conversion Tables, Hardness Conversion Tables and a Temperature Conver-

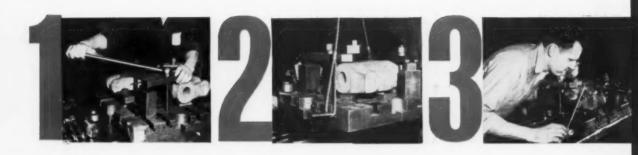
In addition, the catalog gives background information about Sandvik and the reasons behind Sandvik steel's quality. It lists some of the specialized applications for which these steels are used and tells what information to give when inquiring or ordering.

Have this complete, easy-to-use spring steel catalog at your fingertips. A note on your letterbead will bring it to you promptly and without obligation.

#### FEATURE ARTICLES

Cut changeover time—

## Boost Your Machining Output with "Packaged" Setups



- ◆ Frequent job changes can keep machine tools idle much of the time... Setups made by machine operators can be good or bad... But either way, they waste time that should be devoted to making chips... This idle time has long been a problem, especially on milling and boring jobs.
- ◆ One firm found an answer you should be able to apply . . . Take your best setup man and give him the job of packaging setups in advance for less skilled operators . . . All he needs is a precision surface plate, some bases for mounting workpieces, and a quiet area to work in.

By E. J. EGAN, JR., Machinery Editor

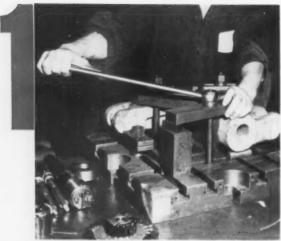
◆ THE SIGHT of idle machine tools being set up for the next workpiece is a common one in many jobbing shops. What's wrong with that? Isn't a certain amount of time necessary for setup changes?

A "certain amount of time"—yes. But as much as you're accustomed to seeing? Maybe not.

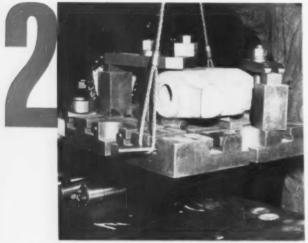
The idea of "maximum machine tool utilization" isn't just a fancy phrase the mass-production boys bandy around. Those four words should sum up a money-making and moneysaving goal for every job shop operator.

For proof, take a look at the F. J. Stokes Machine Co. in Philadelphia. Since last December the firm gained the equivalent output of two new milling machines without investing in any new capital equipment.

How was this done? Simply by taking a top



FIRST step: mount workpiece on a sub-base and assemble all tools to be used on the job.



AS soon as a milling machine needs new work, the setup package is hoisted into position.



WITH setup keyed quickly to the machine table, the operator wastes no time before making chips.

milling machine operator who was skilled at setup work and having him set jobs up for the other operators—but not at their machines. He does this on specially designed base plates well in advance of the time these jobs are to be machined.

This means that when an operator finishes milling one job, another setup (on its special sub-base) is immediately hoisted up on the machine table. There it is quickly keyed-into position and the operator starts making chips right away. That's what he's paid to do, and that's what his machine is built to do.

But this simple, successful plan didn't just happen. There's an interesting—and probably fairly typical—history behind its development.

Much of the work processed through the firm's machine shop is the one-of-a-kind variety. Seldom are there more than five or ten identical parts to be machined in succession. This wasn't any particular problem until a growing volume of business put heavy pressure on the shop for more production.

#### Couldn't buy new machines

The answer couldn't be found in more working hours; the department was already on a three-shift basis. Buy more machine tools? Not feasible, for three reasons: (1) limited floor space, (2) scarcity of qualified machine operators, (3) cost of the new equipment. Only possible solution seemed to lie in squeezing more output from the present complement of equipment and personnel.

It had long been taken for granted that the 15 milling machines in the shop couldn't always be at work making chips. Some were usually being set up for the next job. And this meant that operators of the idle machines were either busy fussing with bolts or running errands to the toolroom. That's the way it had always been.

Finally someone asked: How much of the time do these men and machines actually cut metal? Here was the key to the whole situation. No one knew for certain.

To find the answer didn't require an elaborate time study. Instead, certain personnel were asked to stroll through the department at various times and unobtrusively note how many machines were operating; also, how many operators were on hand.

It didn't take long to establish the ratio between cutting time and idle time. Armed with the facts, next step was to try to increase the percentage of cutting time. Nothing could be done about reducing the number of setups involved; the shop had to produce what it was given to do.

But a clue developed in the realization that one milling machine operator was an unusually good setup man. His skill and experience enabled him to produce efficient setups that resulted in faster machining, less work spoilage and longer tool life.

Next question: How to use these superior techniques to benefit slower, less experienced workers?

One answer was to use this skilled setup man to assist other operators in lining up their work. The plan was discarded. It might gain some cutting time, but the operators being helped would probably just stand idly by. Moreover, one setup man couldn't handle all the machines that might be ready for job changes at the same time.

#### Idea paid off quickly

Then came the big idea: Give the man the full time job of making standard "package" setups. Furthermore, have him prepare them in a special work area, on special base plates, and in sufficient quantity to keep all machines and operators busy cutting metal.

In less than six months the new system has proven practical beyond any doubt. Loss of the setup man as a machine operator is far outweighed by the overall gain in output.

All except the most simple jobs coming into

### TO SAVE IDLE-TIME DOLLARS

DO . . .

- Try the idea of a full-time set-up man
- Choose a skilled worker who knows his business.
- Give him a special area to work in.
- Supply him with everything he needs.
- See that he gets the tough jobs in plenty of time.

DON'T . . .

- Let your machine opeartors run toolroom errands.
- Have operators waste time in lubricating machines.
- Neglect to insist on optimum speeds and feeds for all jobs.

the milling machine department now go directly to the setup area. Here the man in charge has a large precision surface plate for his setup and layout work. Made of cast steel, it is 54-in. wide, 120-in. long and 6-in. thick. Special "T" slots having a one-inch entrance width are machined across the length and width of this plate. Tolerance on slot width is  $\pm 0.001$  in.

The setup man also has a ready supply of "T"-slotted steel sub-bases. These are made in sizes to accommodate small, medium and large workpieces. On receipt of a workpiece, the setup man selects a sub-base, keys it to the slotted surface plate, and sets up the job quickly and efficiently. One-man control insures that all repeat jobs are processed in a standard manner. And in his eight-hour shift, the one man keeps a steady backlog ahead of three-shift milling operations.

The setup man also requisitions all the cutting tools needed for the job and places them with the workpiece and sub-base. Result is a neat package, all ready for prompt delivery to the next available milling machine.

One way of putting it is that the new system eliminates any excuse an operator might have for not cutting metal. The only times that operators now leave their machines are for personal reasons, or for "coffee breaks." In practice this works out extremely well. Operators do not consider that they're "tied" to their machines. On the contrary, they welcome the opportunity to exercise more of their time and skill at machine control.

#### Plan de-skills tough jobs

Another obvious benefit of the pre-setup technique is that it de-skills the machining job to a great extent. This is evident from the fact that less experienced workers now produce highly acceptable work. They require much less assistance and supervision from foremen than they once did. And the same de-skilling effect makes the job of recruiting new machine operators much simpler.

The pre-setup method has also been applied to certain boring mill operations. Sub-bases used for these jobs have a hole in the center so that the setup can be pivoted for machining at various angles.

Based on the success of the new system, the firm plans to establish a permanent Machine Shop Services group. Its prime purpose: to seek and use additional ideas for saving downtime dollars wherever possible.

For example, plans are being considered for extending the pre-setup technique to certain drill press operations. And although lathe functions cannot benefit from advance setups, a program is under way to see that lathe tool "packages" are delivered to operators.

## For Hire: Vacuum Casting Service Using Certified Alloys

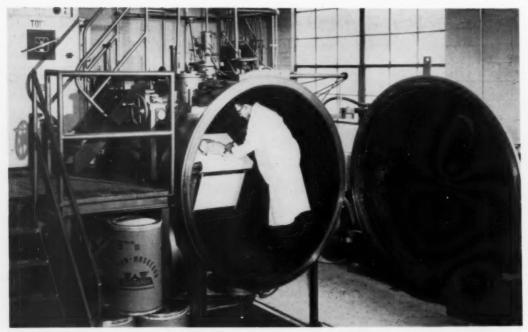
 Wondering if vacuum melting can improve your cast products? Cannon-Muskegon Corp. has the facilities to show you what these purer alloys can do for one casting—or many.

\*A new department specializes in making pure master alloys and vacuum casting them . . . Process costs more than air melting, but customers like the stronger, more ductile end products.

By W. G. PATTON, Engineering Editor

◆ A NEW KIND of service for the metalworking industry—(1) tailor-made, comparatively gas-free certified alloys and (2) low cost, vacuum-melted and poured castings—is now available from Cannon-Muskegon Corp., Muskegon, Mich. In addition, the firm offers other companies the use of its extensive vacuum melting, vacuum casting and metallurgical testing facilities for research projects.

In regular production, the firm makes shot,



OPERATOR stands on turntable which revolves inside vacuum chamber, positions molds for pouring.



COMPOSITION of high-purity alloys is checked on this X-ray fluorescence spectrometer.

billet and cast bar forms in a wide range of air-melted alloys. Some of these include Monel, Invar, Ni-Resist and other formulas containing titanium and columbium.

These master alloys are made in an electric furnace under carefully controlled conditions. Certified chemical analysis and results of mechanical property tests are furnished with each lot. Where castings are to be made from these certified metals, the customer can use his own remelting equipment, or utilize Cannon-Muskegon's new vacuum facilities.

According to the firm's engineers, control of the master alloys is such that their physical, chemical and electrical properties are readily predictable. Careful blending of the shot used in the vacuum furnace assures reproducible results. Use of material in shot form also reduces vacuum melting time by 25 to 50 pct.

The new vacuum equipment was designed by the Michigan firm's personnel and built by the F. J. Stokes Machine Co., Philadelphia. Up to 300 lb of metal can be melted in a single charge and poured into investment, permanent, shell and ingot molds, or other special molds.

The company is aiming at a goal of 20,000 lb of vacuum melted metals per month. Alloys melted in this manner cost about \$3 more per pound than corresponding air-melted grades.

Ultimately, the firm sees low cost vacuum melting as the key to significant product improvement in many phases of the metalworking industry. Belief is that the opportunity to compare a conventionally-made product with the same item made in a vacuum will stimulate considerable development work.

Advantages of vacuum-melted alloys are said to include:

- 1. High purity.
- 2. Improved life at high temperatures.
- 3. Improved ductility corresponding to a given hardness at room or elevated temperatures.

- 4. Increased fatigue strength (due to absence of inclusions).
  - 5. Higher usable tensile strength.
  - 6. Improved impact resistance.

Present applications for vacuum-melted alloys include aircraft castings, bearings for jet engines, valve springs for reciprocating aircraft engines and rolls for thin metal strip. Noted in a long list of materials now under investigation are other bearing metals, tool steels and highly stressed aircraft and jet engine alloys.

A number of C-M's customers show interest in the demonstrated ability of vacuum-melted alloys to be usable at comparatively high temperatures. Another point of interest is that the high ductility of these metals permits the use of unusually low draw temperatures.

Most eye-catching feature of the firm's new vacuum-melting setup is the chamber that contains the furnace and mold table. This is a special tank, six feet in diameter and seven feet long. It is water jacketed to prevent overheating. The inner shell is made of stainless steel; the outer jacket is carbon steel.

Inside the horizontal tank is a 300-lb capacity induction furnace supported by trunnions. The furnace tilts forward for lip pouring. In the pouring position, the lip is directly above a rotating mold table which is also built into the vacuum chamber near its front end.

The mold table is three feet in diameter. Controls outside the vacuum chamber revolve it so that the molds it carries can be brought into position for pouring. Centrifugal castings can be produced, if desired. Molds can be preheated or cooled under vacuum.

In practice, after the furnace is charged and the molds are positioned, the tank is closed and evacuated. A vacuum lock arrangement permits making alloy additions during the melting cycle. Heats are poured under 10 microns of pressure.

The vacuum system includes two 10-in. booster pumps which are backed up by two mechanical pumps. Three indicating pyrometers and an ionization gage indicate temperatures and pressures at different points in the furnace chamber.

Power for melting is supplied by a 100 kw motor generator set operating at 220 amp, 440 v.

The complete installation has 16 separate water circuits for cooling the tank, pumps, condensers and induction furnace coil.

C-M's engineers emphasize that much of their research work is designed to satisfy a need for simple, low cost vacuum melting equipment in the foundry field. In fact, small vacuum furnaces for investment casters are already on the way, will cost from \$5000 to \$8000 exclusive of electrical apparatus. These units will be approximately two feet square, and will pour eight to ten molds per hour.



CONDITIONED air delivered to this well-lighted spray booth is dust free. Excess spray is drawn through floor grating for recovery.

Good recovery, too-

# Paint Spray Setup Features Quality Work, Easy

Maintenance

- Sleek, smooth paint jobs in multiple colors help sell a lot of automobiles . . . Production spraying systems have to be flexible and easy to maintain . . . Clean, dust-free air in spray booths is a must . . . Amount of paint reclaimed is a measure of efficiency.
- ◆ Paint shop at Chrysler's Canadian plant was designed with all these goals in mind . . . Air to the spray booths is washed and double-filtered . . . All functional equipment is readily accessible for maintenance and repair . . . Paint recovery rate is excellent.

By W. G. PATTON, Engineering Editor

♦ A POLICY of planned cleanliness and good housekeeping pays off in quality paint jobs at Chrysler Corp. of Canada's passenger car plant at Windsor, Ont. The plant produces Chrysler, Dodge, Plymouth and DeSoto cars, and paints all of them on the same line. A complicating fact: 85 pct of the cars have multi-colored bodies.

In the modern paint shop, vacuum cleaners have replaced brooms and fully enclosed and protected paint lines have replaced the usual open circuits. Flush construction, inside and outside paint booths, cuts down dust and dirt accumulation on projections and shelves. Planned accessibility facilitates servicing and cleaning. Every bit of the generous supply of fresh air to paint booths is filtered twice to remove dirt particles.

Many of the paint shop's features were planned jointly by Chrysler of Canada engineers and representatives of the R. C. Mahon Co., Detroit. The latter firm furnished the complete paint spraying and baking equipment.

The entire paint shop occupies an area 960

Right: ENTIRE body finishing line is contained in an area 960 ft long and 120 ft wide. Bodies enter line on "up" ramp (lower right), finally e merge fully painted on "down" ramp (top left).

Left: SYNCHRONIZED conveyors are a shop feature, here move bodies up and into a bonderite machine.

ft long and 120 ft wide. Car bodies enter the shop floor by a single ramp. All paint operations are performed in this space, including bonderizing, sealing, wet-sanding and application of final colors. Painted bodies then move out by descending conveyor to the trim department.

Paint storage is provided outside the paint shop in a building 80 ft x 120 ft. Fire doors and a fire wall separate the mixing room from the paint shop. In the mixing area, there are two 50-gal tanks for each of the 20 standard colors. Paint from one tank is pumped through the system while the second tank is mixing.





HINGED panels inside spray booths permit quick access to critical spray system components.

When the first tank is exhausted, the second one is switched over without delay.

Generous quantities of air for the spray booths comes from eight air supply rooms located on the roof. In addition to supplying heated air, these rooms maintain desired humidity in winter. Washing the air also serves to reduce its temperature in the summer; a drop of 12°F on a warm day is not unusual.

Fans in these air intake rooms are interchangeable. Each is rated at 50 hp and 75,000 cfm. Two fans operate in each of the eight air intake stations.

The warm, washed air supply passes through banks of fiber glass filters before it reaches the painting area. A gage on the filter bank gives a constant indication of the air pressure on the entrance and exit sides of the filters. When the gage shows a large drop in pressure, all filters in the bank are changed. Electrical outlets in this area facilitate filter cleaning with vacuum cleaners.

Ducts to the paint shop run overhead, and each duct opening curves slightly downward to carry air directly to the workmen in the booth. Outlets have another set of filters to catch any dust or dirt accumulations in the duct system.

#### Diffuse air to pattern

After passing through filters, the air entering each spray booth is diffused from overhead through a series of adjustable microfusers. This permits adjustment of the air distribution pattern as desired.

The air washing process in each booth includes both an impinging and a scrubbing action as the exhaust air comes in contact with treated water in the flood chamber. The bottom of this chamber slopes toward the center of the booth from each side, and a flood of water passes over its entire surface while moving from the washing chamber at each side to the sump trough in the center.

The exhaust air then passes through vertical washing chambers where any remaining

paint particles are struck by torrents of water from high pressure jets arranged in a header at the top of the chamber.

Constant down pressure of air from above is balanced with a suction through the traveling grating, which extends the full length of each booth. This controlled air flow effectively removes overspray from the work area.

The grating travels very slowly at a rate of 4 in. per min. A hot caustic bath, followed by a cold water rinse, effectively removes paint from the grating and eliminates the need for the usual week-end maintenance. The water curtain supplies 32 gal per ft on each side of the booth.

The Mahon baking and drying ovens for the painted bodies are gas fired. They are zoned to provide efficient heating where it is needed.

Another feature of the drying system is the use of cooling tunnels. This setup permits control of the cooling rate, saves floor space, and also assures delivery of the jobs to workmen at comfortable working temperatures.

#### Reclaim paint

The paint department also benefits from the use of a centralized reclamation system. As paint-laden water from the spray booths enters the reclamation tank, its velocity is slowed down. This facilitates settling of the heavy, non-floating particles so that they accumulate in the bottom of the tank. The settling tank is shoveled clean and washed down approximately every four weeks.

Meanwhile, floating paint particles which have been treated to reduce stickiness, float to the opposite end of the tank. A paddle conveyor skims these off the surface of the water. The accumulation is then carried to the ground floor where it is deposited automatically in drums. Chrysler reclaims approximately 10 bbl of usable gray material for every 14 bbl of paint skimmed off.

All bodies in the painting area travel on conveyors furnished by the Jervis B. Webb Co. Total length of the conveyor system is approximately 4,265 ft. It is divided into 5 lines, connected by U-turns, and runs up and down the length of the shop. Conveyors are synchronized.

The use of flush construction, both inside and outside the booths, simplifies the house-keeping problem. Another contribution to good housekeeping is the use of hinged or removable doors. These simplify access to functional parts of the system, paint lines and other areas requiring cleaning or service.

Since a plentiful supply of water is so essential to the operation of the paint shop, powerful pumps must be used. Standby equipment is kept ready to pick up the load immediately in case of breakdown.

## Testing Device Tracks Down Shaft Vibration

♦ VIBRATION and rotation have long warred with one another. A new measuring device now helps make the peace by spotting and graphing the resultant destructive force.

A rigid control of vibration contributes materially to improve performance and long service of rotating parts. High amplitude torsional vibration at running speeds shows up in noise, high gear wear and reflected vibration of stationary parts. In exceptional cases, failure of shafts or other rotating parts results.

General Electric Co. engineers at Fitchburg, Mass., use the device in testing geared turbine generator sets. The particular problem in one case involved a quill shaft coupling a high speed (10,000 rpm) turbine to reducing gear.

TESTER measures shaft vibration within close limits, enables increased motor reliability.

This quill shaft introduces desirable lateral flexibility between the turbine and the gear. But it functions in a manner encouraging vibration. A design compromise eliminated the problem, it was thought. But confirming tests were required. This lead to use of a Torsiograph, supplied by Consolidated Electrodynamic Corp., Pasadena, Calif.

The Torsiograph detects and measures torsional vibrations from a rotating shaft. It spots instantaneous variations from uniform shaft speed which reduce operational efficiency of engines and machinery.

This the device does by translating torsional vibration motion into an electrical signal, then amplified and integrated to produce an oscilloscope tracing proportional to torsional amplitude. For on-the-spot frequency and relative amplitude observations, the vibration signal feeds into a vibration analyzer.

#### Test in speed steps

First peak response is observed and the approximate shape of the resonance curve obtained as a function of generator speed. This enables proper speeds to be set later for accurate frequency and amplitude records.

In testing, generator speed slowly increases from 900 to 1320 rpm. A frequency meter measures speed by checking a terminal voltage signal fed from the generator.

The frequency analyzer tracks generator speed, picking up also fundamental torsional vibration response. As vibration response reaches its peak, the operator sets analyzer meter reading arbitrarily at 100 pct. Generator speed changes in discrete steps as the operator plots an approximate resonance curve.

Selected speeds then adequately define and verify the final curve on a recording oscillograph.

Experimental results derived from these tests by GE permitted final design of the quill drive shaft for the generator set. Desired low amplitude torsional vibration resulted.

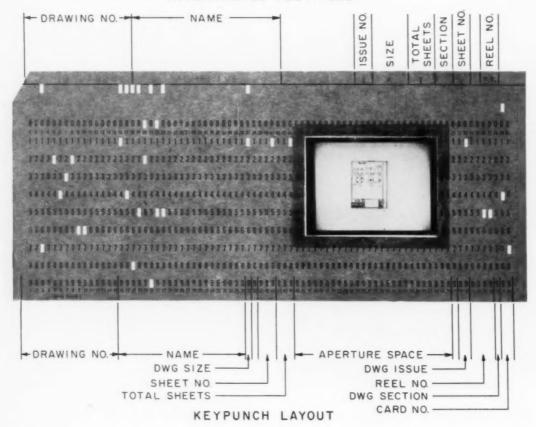
# Stop Playing Hide-and-Seek With Engineering Drawings

- You lose up to 20 pct of your time just searching for drawings and engineering facts... Avoid much of this wasteful papershuffling with an upto-date drawing control system.
- One installation saves 8 manhr every day on several punched card files . . . Each mounts microfilmed drawings and specifications . . . Your present accounting equipment may get you started.

By C. M. GASTON, Manufacturing Information Engineer, Bell Telephone Laboratories, Inc., Whippany, N. J. ◆ EVER FIGURE OUT just how much time you fritter away looking for engineering drawings? Bell Telephone Laboratories, Whippany, N. J., did, and concluded it lost enough money to pay for five extra engineers for an entire year.

A new drawing control system resulted. It eliminates up to 95 pct of wasteful and non-productive paper shuffling in the military design engineering department. Specifically, the new system (1) Eliminates prints completely, except for personal copies. (2) Saves

#### INTERPRETED POSITIONS



about 20 minutes search and wait time on each drawing and specification requested from the files. (3) Makes drawing changes widely available at a few cents each, sometimes only hours after approval of the completed tracing. (4) Completely mechanizes filing and refiling of drawings. (5) Eliminates clerical work in preparing parts listings and drawing indexes.

It's now entirely possible to speedily compile accurate-to-yesterday parts catalogs of complex products without a single human referral to the drawings.

Small and large metalworking shops can benefit equally from such controls, in relative savings of time, labor, fioorspace, and increased equipment productivity.

Punched cards form part of Bell's drawing control system. Microfilms fill out the program. The two combine into aperture cards mounting 35mm black and white transparencies.

Beauty of the system lies in its simplicity and flexibility. Depending on drawing volume, the following alternates present themselves to even the smallest metal fabricating shop. Bell Laboratories chose the first, for good reason.

First—A fully mechanized drawing control system, such as developed here. Drawing turnover need not be spectacularly high to justify the setup. This is particularly true if other plant departments already use electric accounting machine (EAM) cards and equipment. At Bell, less than 10,000 new drawings and specifications drop into the system monthly. At the other end of the scale, it is understood that Wright-Patterson Field (AFSC), Dayton, handles about 100,000 drawings monthly.



PUNCHED FILM CARDS cut lookup time up to 20 pct, select mechanically, enlarge to full size.

Second—An attractive alternate applying to those metalworkers who expect in the foreseeable future to install for any purpose machines capable of handling EAM punched cards. By installing the system now, a shift later to full mechanization pays substantially.

More often than not, this alternate amortizes itself before introduction of machine sorting and filing. Reduced lookup time even without mechanization helps accomplish this, as do savings both in floor space and filing equipment investment.

Finally—For those disinterested now or forever in punched cards, come microfilm drawings mounted on conventional 3 x 5 or 4 x 6 in. cards. Some such installations reportedly paid for themselves in one year's time.

Time study people showed Bell earlier that engineers and draftsmen can lose roughly 15 to 20 pct of their time just hunting for information. Most new equipment incorporates numerous standard parts or preferred designs. In some fields (including metalworking), the engineer must constantly mull over hundreds, even thousands of standards in designing a single product. The list ranges from selection of one material from a recommended list, right up to acceptance testing

#### Conserves 8 manhr daily

Time studies show a saving of about 20 minutes on each item referred to. About 20 to 30 people refer to these files daily. This represents a saving of about 2 manhr daily per file over the old procedure.

Currently, engineers and draftsmen view drawings at one of five microfilm stations. In one day, the salary of an engineer for a full week is saved. That's enough manhours to hire five additional full time engineers at no added cost to the company.

Actual costs for equipment and for microfilming and mounting are nominal. Prices for viewers run from about \$120 to \$1500 and more. A viewer priced in the lower range often satisfies all requirements. Total cost for microfilming, mounting of the transparency and indexing should run no more than 10 to 12 cents per drawing, according to the originator of the technique, Filmsort Div., Dexter Folder Co., Pearl River, N. Y.

If engineers know the exact drawing or specification number, they pull the applicable card personally, and insert it into an adjacent microfilm viewer. An alphabetical listing supplies this number if unknown. Where a number of cards on a given subject must be checked, the operator sets the sorter to reject all those bearing that drawing name. Collating machines mechanically file and refile cards. Tabulating equipment automatically types out the drawing index and parts list.

For inactive drawings and specifications, aperture cards promise large savings in floor space and filing equipment inventory. Obsolete drawings, layout studies, sketches and other records need to be preserved for patent and other legal reasons. Microfilm mounted on aperture cards does this. Originals then are sent to dead storage or destroyed.

The military department alone at Bell Laboratories has 1½ million inactive cards. A single 20-drawer microfilm cabinet holds about 55,000. It occupies 12 sq ft, about 5 pct of the 240 sq ft floor space required previously.

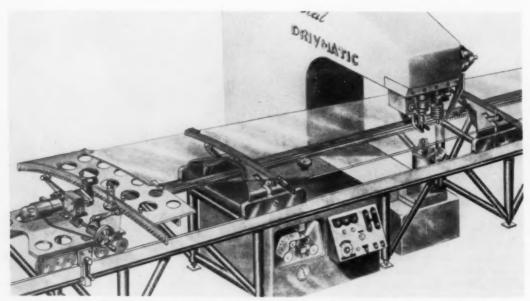
# Piano Roll Template Plays Complex Riveting Pattern

- ◆ To mechanize or not in low volume production is a pretty tough decision . . . Where complex patterning enters, as it often does with riveting or resistance welding, it's harder still.
- \* Easily stored, transparent template rolls now sequence and guide automatic equipment through seldom repeated but complex patterns... Operation is rapid and economical... In one riveting operation, productivity tripled.

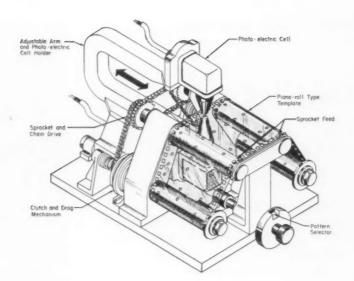
By J. D. HUTSON, Tooling Analyst, Convair Div., General Dynamics Corp., Ft. Worth, Tex. ♦ COMPLEX RIVETING PATTERNS normally call for manual operations, usually including excessive layout manhours. In line production, this leads to fabricating tieups, high machine downtime, low productivity and idled workers.

Fully automatic machinery at Convair Div., General Dynamics Corp., Ft. Worth, Tex., gets rid of such obstructions, and improves quality at the same time. Productivity has tripled on light metal wing sections 30 ft long by 6 ft wide which undergo a complex riveting operation.

Specially marked, dimensionally stable cloth rolls past a photoelectric scanner to sequence and monitor the full riveting cycle. The control sys-



AUTOMATIC RIVETING CONTROL accurately positions panels up to 30 x 6 ft at speeds of 5 ips.



GLASS FIBER template roll sequences and controls riveting action, triples machine output.

tem is readily adaptable to other sheet metal products. It is equally applicable in some resistance welding operations involving complex, repetitive patterning.

The riveter accurately locates, drills and countersinks the rivet hole, feeds and inserts the rivet, then bucks it flush. Completion of one riveting operation takes only a few seconds. The equipment comprises a standard automatic riveter plus shop-designed controls.

Layout time is a problem only once, for thereafter the cloth roll serves as a permanent template. Worker fatigue, formerly a serious quality control factor, dropped immediately. Little time is spent on setup and maintenance. The aluminum wing sections on B-52 jet bombers now pass inspection with almost monotonous regularity, thanks to improved consistency in riveting quality. Similar equipment for Convair's San Diego plant rivets aluminum skins of F-102 jet interceptors.

A glass enclosed photoelectric scanner controls cycling completely. Rolled glass fiber drawing cloth 8 in. wide feeds past the scanner on paired drive sprockets. The cloth template incorporates the master riveting pattern, laid out in a series of precisely drawn and located inked bars.

#### Rivets to bar pattern

For operator convenience, red bars in water soluble ink identify starting and stopping points. Yellow bars show station, buttock or water lines, and black bars the rivet pattern.

As the electric eye traverses the template width, the black bars break the light beam. This actuates a signal transmitted electrically to relay switches of the riveter and positioning equipment. Relay switches so interlock that on completion of one operation, the equipment progresses smoothly, automatically to the next.

Tool research engineers at Convair tailored the controls for automatic fastening of sheet aluminum panels on existing Drivmatic equipment, supplied by General Riveters, Inc., Buffalo. A  $1\frac{1}{2}$ -hp dc electric motor powered by an amplidyne moves the positioning carriage through a rack and pinion drive. The carriage travels laterally at  $2\frac{1}{2}$  ips, or transversely at 5 ips.

Reversing the field current of the amplidyne brakes the carriage to a full stop in 1/25 second. From a standstill, the workpiece accelerates to full speed in about 1/50 second.

#### Control action remotely

Required accuracy in hole location on this operation is not unduly critical, and  $\pm$  0.015 in. is considered satisfactory. If necessary, redesign could improve this figure substantially. On the first hole, the carriage overtravels slightly, a machine feature. The template shop compensates for this in laying out the cloth roll.

In operation, the worker controls riveting action through a plug-in extension cord. This encourages continued and close observation of the automatic cycling, and permits near instantaneous cutoff in the event of malfunction.

Either single or automatic cycling can be rapidly scheduled by adjusting the appropriate controls on the master panelboard. On automatic, the workpiece progresses through one riveting operation after another, so long as the operating button is continuously depressed.

Initial use reveals great potential savings in equipment of this type for fabricating assemblies too large or heavy for manual handling. It also promises welcome economies in low volume production, cost of which long has annoyed the aircraft industry. Moving to other metalworking areas, the technique adapts easily even to production milling and inspecting operations.

# Mill Controls Toughen Steel Plate

- ◆ Steel plate is basically tough—but how can it be made even tougher? . . . One mill's answer is closer rolling controls, tighter chemistry.
- If you're a plate user and interested in high product quality, this shop-tested approach tells how it's done...
  Even slab size makes its mark in providing
  a consistent product with superior notch toughness.

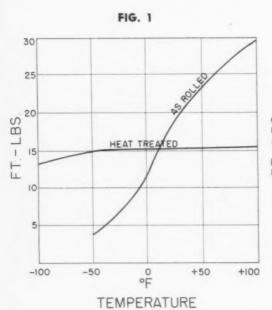
By J. P. CLAIR and GEORGE RAYNOVICH, Metallurgists, Jones & Loughlin Steel Corp., Pittsburgh

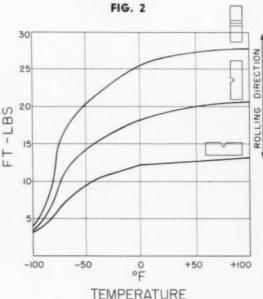
MOST users of steel plate aren't likely to object to product improvement. One such improvement—obtaining a low alloy steel plate with superior notch toughness—has now been reduced to a workable system. As an important forward step in steelmaking, it should meet with widespread interest.

Steel-whether plain carbon or alloy-is a basically tough material. But its degree of

toughness is subject to many variables. Its dynamic properties can be drastically altered —upward or downward. Notch toughness is a dependable measure of some of these important properties. For this reason, the improvement of notch toughness continues to be a prime engineering objective.

How can the notch toughness of low alloy steel plate be held at a consistently high level?







Overall view of J & L's 96-in, hot strip mill at the company's Pittsburgh Works.

Recent tests conducted by the Jones & Laughlin Steel Corp., Pittsburgh, emphasize close control of steel chemistry and mill practice. Singly or in combination, a restricted chemistry, a preferred slab size, and an optimum ratio of pct aluminum to pct sulphur in a fully killed steel—all are factors in the improvement of notch toughness.

Notched-bar impact testing incorporates

three conditions which lead to brittle failure:
1) severe notching, 2) impact loading, and 3) low temperature. Less energy is required to fracture as temperature is lowered, indicating transition from a ductile to a brittle state. Eventually, a temperature is reached where the steel exhibits a minimum amount of toughness and breaks under very light loads.

Most investigators have established their own methods of analyzing data to determine these critical transition temperatures—fracture or propagative temperature and ductility or initiative temperature. At present, the generally accepted criteria for mild, rimmed or semi-killed steels are: 1) a 50 pct fracture denotes fracture transition temperature and 2) a 1 pct lateral contraction beneath the notch indicates the ductility transition temperature.

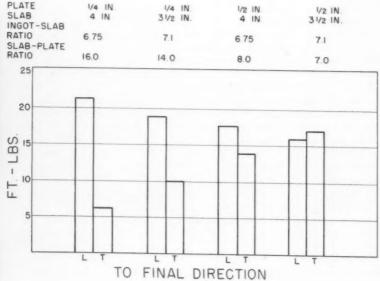
#### Fully killed steels differ

For each type of steel, different criteria must be used to analyze notched-bar data. Mild, rimmed and semi-killed steels react differently than fully killed steels. Fully killed steels, in turn, will vary depending upon condition—as rolled or heat treated.

Fig. 1 provides a typical example of such differences. The as-rolled plate has good properties at room temperature but embrittles at —25°F. The heat treated steel shows considerably less ductility at room temperature but remains fairly ductile to well below —100°F.

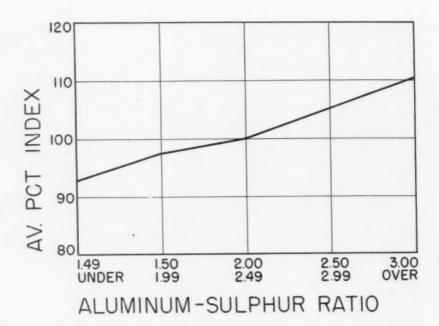
For test purposes, J & L's program made use of a typical quenched and tempered molybdenum-containing steel. Fully killed, the composition range of the steel was as follows: carbon: 0.22-0.32 pct, manganese: 1.45-1.85 pct, silicon: 0.18-0.23 pct, molybdenum: 0.40-0.50





May 17, 1956

FIG. 3



pet, with both sulphur and phosphorus held at 0.04 pet max.

This steel was water quenched from 1625°F and tempered in the range of 800-1000°F to produce a hardness of 280-401 BHN, dependent upon gauge. A transition curve for this material indicates that embrittlement occurs below —150°F. Present service applications at such a temperature are not anticipated. But the improved toughness of this steel is desired over the entire range of temperatures from 70°F to —150°F. Testing temperatures were 70°F and —40°F.

#### Directionality vs impact values

The effect of directionality on impact values is important. Fig. 2 shows the effect of such directionality on the transition curve. The orientation of the notched-bar test specimen to the plate is shown for each curve. It is significant that although very high values are indicated for the longitudinal test, its embrittling range shows no marked difference.

The comparison of longitudinal and transverse values for "straight-away" and "cross-rolled" material is of considerable interest. For these studies, minimum values were used. This required transverse tests in all cases.

To determine "transverse" in "cross-rolled" characteristics, the material was rolled from a 27 in. ingot to a 4-6 in. slab. The slab, in turn, was rotated 90 deg. and rolled to ½-2 in. plate. The ratio of reduction of the ingot to a 4 in. slab is 6.8 to 1. From slab to ½ in. plate, the ratio is 16 to 1.

The higher ratio predominates, and tests transverse to the greater reduction indicate

the minimum value. In general, the nearer the ratio of ingot to slab approaches the ratio of slab to plate, the closer are the longitudinal and transverse impact values.

For material  $\frac{1}{2}$  in. thick or less—with the ingot size and finished size constant—slab size had to be the determining factor. This was altered to provide a more favorable ratio. Thus mill practice was adjusted to handle a  $3\frac{1}{2}$  in. slab. As shown in Fig. 3, subsequent tests indicated a definite improvement.

A major variable in any steel is its chemical composition. For this reason, an attempt was made to correlate such variations with impact data. A statistical survey base on 1000 heats of steel showed a parabolic relationship between the carbon and manganese contents and the pct of index. The relationship of element to index was linear when phosphorus and sulphur were similarly checked. The same linear relationship holds the ratio of pct aluminum to sulphur as shown in Fig. 4.

With a "restricted" chemical composition, a more significant correlation was found in the aluminum-sulphur ratio. Heats with, "restricted" carbon and manganese but with an "out-of-line" aluminum-sulphur ratio fell below 100 pct index.

Conversely, many heats with "out-of-line" carbon and manganese and "restricted" aluminum-sulphur ratios were well above 100 pct index.

Based on this fundamental relationship, open hearth practice was adjusted to provide the more favorable aluminum-sulphur ratio. This resulted in eliminating failures in a significant number of heats.





Elastic Stop nuts secure clutch drums to gears.

The engineering concept behind Link-Belt's new LS-98 Shovel-Crane provides a highly portable machine with big shovel characteristics plus stepped-up work cycles that produce substantial increases in capacity. To do this, the shovel-crane had to be built to stand up under heavy vibration and extreme shock loads. That's why Elastic Stop nuts were chosen for the critical fastening jobs throughout (i.e., hook rollers to brackets, clutch drums to gears, counterweight to upper frame, drum laggings to brake drums, engine mountings, side housing to revolving frame, etc.).

The locking principle of Elastic Stop nuts has been tested and proved by over 25 years of actual field service on equipment like this in every conceivable product of industry from locomotives to roller skates. What's special about this nut? For one thing, you can "stop" it at any position on the threaded length of the bolt . . . or wrench it tight against the work. No matter where you leave it on the bolt, it will remain tight in that exact position, even though you subject it to heavy vibration and shock loads. Reusable many times.

Elastic Stop nuts are available from a watchmaker's 0-80 all the way to 4"—in stainless steel, brass, aluminum and other alloys. Protect *your* product with "fastener insurance." We'll supply free test samples.



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#### **New Technical Literature:**

#### Catalogs and Bulletins

#### Thread fittings

Three new sealing applications on straight thread fittings are detailed in a 24-page brochure. It describes, explains, and illustrates the firm's CN (captive nut) fitting that seals without "O" rings; the SR, metal ring seal fitting; and the SA (the new "O" ring seal fillings). The brochure has 45 different fitting illustrations along with specification charts on sizes, part numbers and necessary dimensional data. It shows complete information on where to use different fittings, and how to adapt them. L & L Mfg. Co. For free copy circle No. 1 on postcard, p. 113

#### Variable speed drives

Booklet carrying multi-color tables for selection of variable speed "Texrope" drives has been released. In addition to providing selection tables for A, B, C and D section variable speed drives, the booklet includes information on design features, drive principles and horsepower rating tables for A, B, C, D, and E section belts. It also includes a speed range table showing the variation in rpm when using two "Vari-Pitch" sheaves in combination, and accessory equipment for the "Vari-Pitch" drive. Allis-Chalmers Mfg. Co.

#### For free copy circle No. 2 on postcard, p. 113

#### Indexing mechanisms

New 24-page catalog (No. 106), contains selection and application data on a firm's high speed indexing mechanisms. Included are methods of calculating load requirements, load ratings based on a minimum of 8000 hours operation without maintenance and dimensions of many stock and standard drives. The catalog also introduces the new "Trans-Pac," a standard packaged power unit for indexing straight line assembly machinery. Ferguson Machine & Tool Co.

For free copy circle No. 3 on postcard, p. 113

#### FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 113.

#### Mountings, bases

A line of "floating rail" vibration mountings and fan and motor bases is described in a catalog just issued. These units are especially designed for use with refrigeration and air conditioning equipment. Detailed descriptions of design features are given and include high deflection rubber-in-shear isolators and channel supports. All units have a natural frequency of 370 cycles per minute and are recommended for a disturbing frequency of 750 cycles per minute. Illustrations of typical installations and schematic drawings are given. T. R. Finn & Co., Inc.

For free copy circle No. 4 on postcard, p. 113

#### Hardness testers

To describe the functions of their testers for micro and macro hardness testing one firm has prepared a 12-page bulletin. These testers are mentioned as making possible microhardness testing using extremely shallow indentations. They may be used for testing metallic and non-metallic parts such as fine wire, small precision parts, thin metal, superficially hardened surfaces, jewels, plastics and glass. Illustrations of the three models, listing vertical capacities, load in grams, weight in pounds, as well as text copy treating the principle of applications have been included in the bulletin. Wilson Mechanical Inst. Div., American Chain & Cable Co., Inc.

For free copy circle No. 5 on postcard, p. 113

#### Steel strapping

Forty-four page steel strapping catalog is described as containing constructive ideas to help speed packaging, lower handling costs and achieve safe shipment. The booklet contains more than 65 drawings and photographs showing steel strapping applications in use today. Acme Steel Products Div., Acme Steel Co.

For free copy circle No. 6 on postcard, p. 113

#### **Electrical equipment**

A new 36-page catalog of electrical service entrance equipment has been announced. Known as the 1956 Quick Guide and designated TCD-17, the publication contains pricing information and detailed descriptions of service entrance devices for industrial installations. Assemblies & Components Sales, General Electric Co.

For free copy circle No. 7 on postcard, p. 113

#### **Bulk** conveyor

A 12-page folder is available on the design and use of conveyors for handling such bulk materials as scrap, coal, ashes, sand, gravel and stone chips. It supplies engineering data and actual in-use installation information. Jervis B. Webb Co.

For free copy circle No. 8 on postcard, p. 113

#### **Tubing data**

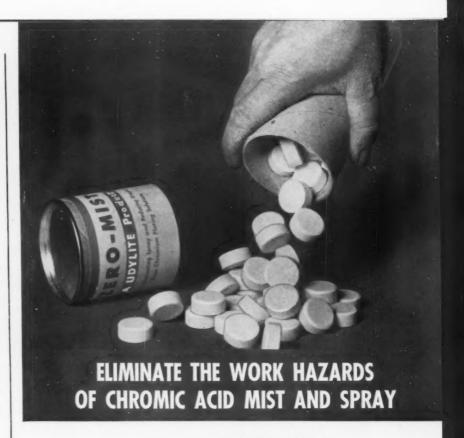
New technical data folder gives the maximum allowable stress values (S) for ferrous pipe and tubing. Included are the values at various temperatures for a complete range of seamless and welded carbon, alloy and stainless tubing steels. Tubular Products Div. of The Babcock & Wilcox Co.

For free copy circle No. 9 on postcard, p. 113

#### Marking machine

Rotary table marking machine, discussed in a new brochure, is a high-speed unit for the marking of cylindrical or cone-shaped parts. It is mentioned as operating at a rate of from 6000 to 7000 marked parts an hour. Jas. H. Matthews & Co.

For free copy circle No. 10 on postcard, p. 113



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by A. B. HOEFER vice president FREDERIC B. STEVENS, INC.

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A trend is developing. Volume of Stevens Automatic anodizing equipment sold in 1955 was nearly double the volume for the two preceding years. At the same time, sales of Stevens compositions used in buffing and polishing aluminum were showing a 50% increase.

Frederic B. Stevens, Inc., manufacture equipment for both nickel-chrome and aluminum finishes. We believe both types of finishes will increase in demand but at the moment the interest in aluminum is high.

If you are considering aluminum for your product, you can be assured that aluminum parts can be bright anodized and finished to compare favorably with the fine finish of chrome plate. In addition, aluminum can be dyed, resulting in non-fading colored finishes.



cal Stevens Automatic Proce

Stevens aluminum anodizing equipment is presently being used and recommended in the finishing of colored anodized tumblers, utensils, refrigerator components, rivets, automotive trim, lighting reflectors, etc.

Stevens' experience in furnishing complete anodizing equipment installations assures you of the latest techniques—the finest finishes at the lowest costs.

For long range planning consider the versatility of Stevens Automatic equipment. Changes of cycles or processes can be accomplished quickly and inexpensively. Your Stevens Automatic Processing Machine for anodizing can be changed to a nickel-chrome cycle at a later date.

If your design engineers are talking of aluminum to add sales appeal excitement, cost reducing features to your new product lines, let us discuss your requirements with you.

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#### FREE TECHNICAL LITERATURE

#### **Dust exhausters**

A new product bulletin describes different designs of exhaust hoods for dust control in the woodworking industry. It is the third manual to be compiled from a series of articles entitled "Scrapbook of Exhausting Ventilation." The 12-page bulletin pinpoints and explains exhaust ventilation in connection with sanders, saws, wood borers, moulders, tenoners, planers, and shapers as well as exhaust volume and transport velocity. The different positions of woodworking hoods are also diagrammed for each situation. American Air Filter Co., Inc.

For free copy circle No. 11 on postcard, p. 113

#### **Bronze** products

Miniature-sized catalog lists and describes a firm's line of industrial bearings, bushings and bars. Included in the booklet is information on electric motor bearings, general purpose bearings, and graphited bronze bearings, with progressive size listings for each. Also included is data on hexagon bars, Ledaloyl bearings, universal bronze bars and on sleeve bearing design practice. Johnson Bronze Co.

For free copy circle No. 12 on postcard, p. 113

#### Resin material

Celoron-described as a low cost phenolic with good mechanical strength-is the subject of a 14page catalog. The product is mentioned as available in four forms: sheets, molded-laminated material. molded-macerated material, and a combination laminated - macerated material. Continental-Diamond Fibre Div., Budd Co., Inc.

For free copy circle No. 13 on postcard, p. 113

#### Portable lifts

Factors to be considered for the proper application of portable lifts are now available in a report in reprint form. The literature details the where's, when's and how's of using portable lifts which are designed to provide the advantages from mechanized raising and lowering of loads coupled with the economies of non-powered horizontal transportation. Oster Mfg. Co. For free copy circle No. 14 on postcard, p. 113





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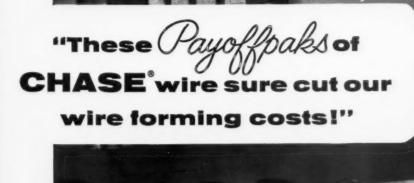


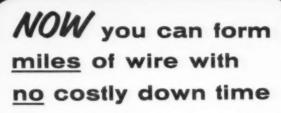
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#### Across the world - and still expanding

Abrasive and Grinding Wheel Plants — Worcester, Mass.; Santa Clara, Calif.; Hamilton, Ontario; South Africa; England; France; Germany; Italy

Grinding and Lapping Machine Plant — Worcester, Massachusetts

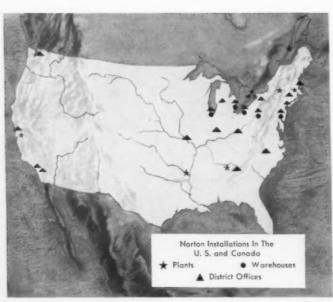
Electric Furnace Plants — Huntsville, Alabama; Chippawa, Ontario; Cap-de-la-Madeleine, Quebec Behr-Manning Plants — Coated Abrasives and Pressure-Sensitive Tapes — Troy, N. Y.; Canada; Australia; France; Northern Ireland

Refractories and Electro-Products Plant—Worcester, Massachusetts

Norton Pike Plant—Sharpening Stones—Littleton, New Hampshire

Bauxite Mines - Bauxite, Arkansas

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From coast to coast. Besides the Norton plants and warehouses and district offices indicated here, there is a Norton distributor convenient to every manufacturer in the U.S. A. Norton warehouses are located in important industrial centers. Abroad, Norton has plants in England, Northern Ireland, France, Germany, Italy, Australia and the Union of South Africa.



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This is where the basic tools you depend on, directly or indirectly, are made. This is Norton City.





Processes. The first continuous tunnel kiln for processing grinding wheels was pioneered by Norton 30 years ago. This one is a recent Norton development. It is used in the firing of grinding wheels and provides a closeness of quality control never before possible. Modern electronics guard quality continuously.

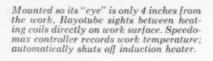


Products. Here a workman is applying ROKIDE® A coating to a guided missile part, which must have strong resistance to high temperature and to abrasive and corrosive wear. ROKIDE A is one of the newest Norton products developed to meet these increasingly severe conditions of use.

to make your products better







Typical of parts forged by Super Alloy are nuts and bolts for jet engines, chemical vats and pipe lines, valves for diesel en-gines, automobile tie-rods and initiator chambers to trigger the ejection seats of jet aircraft.

**HEATING BY INDUCTION?** 

# Let Work Temperature" be your quide!

"Heat It Right and You Can Forge It Right!" says John E. Connolly, President of Super Alloy Forge, Inc., Hamburg, Michigan and a pioneer in forging such materials as titanium, zirconium, and the various alloys of cobalt, tungsten, chromium and other expensive metals.

Key to the automatic temperature control of the induction heating operation prior to forging, is a highspeed, small target Rayotube® detector and Speedomax® G controller.

"Our work calls for such extreme accuracy, we just couldn't operate economically without the Rayotube," says Mr. Connolly. "It gives us complete flexibility of working temperatures over a 2000 F range and it's so sensitive we can hold within ± 5 to 10 degrees. Believe me when you're working with metal that costs as much as \$20.00 a pound, you've got to have equipment that's dependable or you can't afford to operate."

If, like Super Alloy Forge, you are presently heating by induction or contemplating it in the future, either experimentally or in an automated production line, this Rayotube-Speedomax combination may be your answer to accurate temperature control . . . your key to reproducible results on a continuous production basis. To investigate just write us at 4956 Stenton Ave., Phila. 44, Pa. and ask for Folder NS3(2).



#### FREE TECHNICAL LITERATURE

These publications describe money-saving equipment

and services . . . they are free with no obligation . . . just

circle the number and mail the postcard.

This section starts on p. 108

#### **Graphite for reactors**

"The Production and Properties of Graphite for Reactors" is the title of a new 61-page book. Written by L. M. Currie, V. C. Hamister, and H. G. MacPherson, the book is a complete printing of a paper presented at the UN International Conference on the Peaceful Uses of Atomic Energy at Geneva, Switzerland, August 8-20, 1955. Detailed information is presented on the production of artificial graphite in the electric furnace, the effects of raw materials and processing variations. and three chapters are devoted to the physical, mechanical, and chemical properties. Said to be the most comprehensive scientific publication on the subject of artificial graphite as a construction material for atomic reactors and accessory equipment, the book is being made available to those engaged in nuclear reactor work. Write on company letterhead to National Carbon Co., 30 E. 42nd Street, New York 17. N. Y.

#### Spray painting

Brochure on electrostatic spray painting explains the "what and how" of one firm's process of spray painting. In explaining this process, both a disk atomizer and a bellshaped atomizer are illustrated in diagram form. Production line examples show a variety of applications of the process in the finishing of industrial products ranging in size from automobile chassis and refrigerator cabinets to toy automobiles and door knobs. Triple head units, stationary disk, and reciprocating atomizing disk units are pictured in the examples. Ransburg Electro-Coating Corp.

For free copy circle No. 15 on pestcard

#### **Expanding-collet**

Announcement of a new 4-page, 2color bulletin on an expandingcollet has been made. The unit is described as a one-piece expanding arbor actuated in the same manner as collets. Illustrated with halftone cut and dimensional diagrams. the bulletin gives detailed information on the new unit, including its design principle, outstanding features, applications, as well as special designs to suit specific needs. Erickson Tool Co.

For free copy circle No. 16 on postcard

#### Titanium descaling

A new technical bulletin describes recommended practices in the use of molten oxidizing descaling salts for salt bath descaling of titanium and its alloys. Operating temperatures and cycles are given for descaling titanium strip, wire, bars, forgings and fabricated parts. Procedures used to avoid burning and pitting are discussed. Hooker Electrochemical Co.

For free copy circle No. 17 on postcard

#### Pressure gages

Publication 1819 details and illustrates two series of gages for the process industries and for heavy duty equipment. The firm's Supergages are in the cast iron series. while the Solfrunts are cast aluminum with cast solid front and safety blowout black seal for protection. Features, as well as a detailed breakdown on the designs available in each series, are covered. A selection chart giving material of construction for tube, socket and tip, case, and ring of these gages is also included. United States Gauge, Div. of American Machine and Metals. Inc.

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#### **Fabrication facilities**

Specialized manufacturing facilities for the fabrication of pressure vessels, high pressure piping and unusual weldments, custom-designed to specification, are described in an 18-page, 2-color brochure just published. It is illustrated with pictures, many fullpage, of the equipment at Foster Wheeler plants in Dansville, N. Y., Carteret, N. J., Mountaintop, Pa., and St. Catharines, Ontario. Types of special equipment fabricated at these Foster Wheeler plants include reaction vessels, autoclaves, fat splitter towers, steam accumulators, nuclear power plant steam generator-heat exchanger vessels and aluminum towers for tonnage oxygen plants. Foster Wheeler Corp.

For free copy circle No. 19 on postcard

#### Grinder truer

Literature is available describing a new form truing attachment designed particularly for use on universal internal and external cylindrical grinders. Known as the Diaform Model No. 10 Universal, the new attachment supplements this firm's present line of surface grinder type Diaforms. It is described as making it possible to form-true complex contours on grinding wheels accurate to "tenths" in a matter of minutes. Mounted on the grinding machine table by an auxiliary carriage, the Model No. 10 Diaform is well out of the way during grinding operations, the maker states, but quickly available for re-truing without disturbing the workpiece. Pratt & Whitney Co., Inc.

For free copy circle No. 20 on postcard

#### **Electric motors**

Detailed information on fractional horsepower electric motors, as well as on a firm's monoMotors, blowers, and special products is included in a 12-page catalog. The AY and BY types of Tri-Flux motors with unicast construction are described, as well as a new line of type CY permanent split capacitor motors. Photographs, diagrams and performance data are also contained in the booklet. Redmond Co., Inc.

For free copy circle No. 21 on postcard

#### Formers and threaders

Bulletin No. E-70-6 describes a company's ¾ and 1 in. automatic forming and threading machines. General and construction features are covered and specifications are given for the two models. Designed for points to length and threads bolts from cold or hot forged blanks, these units are cited for production rates, which on one machine, range from 1800 bolts per hour for the smaller sizes to 750 per hour for the larger sizes. Landis Machine Co.

For free copy circle No. 22 on postcard

#### Hole punching

A full line of self-stripping hole punching and notching units for sheets, angles and channels is described and illustrated in a new catalog. The units are self-contained and can be mounted singly and in groups according to pattern. They are used in stamping presses and press brakes for producing unlimited patterns of holes and notches. The catalog also covers the firm's fabricator machine and drilling machines. Wales-Strippit Corp.

For free copy circle No. 23 on postcard

#### Pallet lifters

Pallet lifters for use with overhead crane equipment are described in a new data sheet. The lifters are designed to handle unit loads under conditions not practical with fork trucks, such as loading and unloading gondolas, open-type trucks, barges and for use in plant yard areas not accessible to ground transportation. Specifications and dimensions for the units are included. Cady Metal Fabricating Co.

For free copy circle No. 24 on postcard

#### Induction heaters

Bulletin GEA-6388, 8 pages, gives specifications, dimensions, operating information, design features, and ratings of a new line of electronic induction heaters. The four models in the line are mentioned as available in four ratings—7½, 15, 25 and 40 kw. Design and construction are fully delineated and illustrated, while specifications are given. General Electric Co.

For free copy circle No. 25 on postcard

Quality and service are the unseen ingredients in the steel that JESSOP makes

For 55 years in America and more than a century before that in England, the name Jessop has stood for high-quality specialty steels. This year with production at an all-time high and orders pouring in from good customers, new and old, one might assume that a company in Jessop's position would become complacent . . . would sit back and reap the harvest from former efforts, and rely on diplomacy to excuse slower deliveries.

Not so with Jessop. Jessop is a young and aggressive organization with a determination for absolute leadership. With business booming, Jessop is about to complete the first phase of an ambitious building program involving mills, furnaces, machines and, above all, good technical men. Jessop means to be sure that, as the tide of production rises, quality and service will not recede. Look at the list of products below. This is a good time to become a Jessop customer.

STAINLESS STEELS • NIGH SPEED STEELS • NOM-MAGNETIC STEELS HIGH SPEED TOOL BITS • HEAT RESISTING STEELS • STAINLESS-CLAD PLATES • CARBON AND ALLOY STEELS • TOOL STEELS FOR SPECIAL PURPOSES • CAST-10-SHAPE TOOL STEELS • HIGH SPEED AND ALLOY SAW STEELS • TEMPERED AND GROUND STEP STEEL • COMPOSITE HIGH SPEED STEELS • STAINLESS AND HEAT RESISTING CASTINGS • COMPOSITE DIE STEEL SECTIONS • PRECISION GROUND FLAT STOCK • DIE STEELS—HOT AND COLD WORK

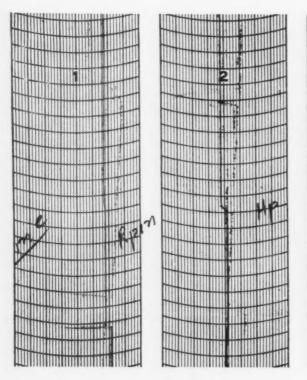
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# hard, strong K7H... KENNAMETAL'S new grade for high-velocity machining

In lab and shop tests, Kennametal\* Grade K7H has proved to be a real "work horse" for high-velocity machining.

It's a genuine carbide—the hardest ever offered by Kennametal (93.5 Rockwell A).

It's strong—two to three times the strength of non metallic cutting materials... strength to resist chipping and cratering... strength to trace and cut to a shoulder... strength to stand up to normal shop abuse without "babying."

It's versatile...has the stamina to cover the range of feeds and depths of cuts for modern high-velocity finishing of steel alloys and the new hard-to-cut materials. Grade K7H even takes casting "skin" and forging scale in stride on light cutting—another indication of its strength and stamina.

#### In the Lab-with tool post dynamometer:

Compared with other carbides at high velocity, Grade K7H showed these results: Test No. 1 (without coolant)

—K7H performance, cutting 29-32 Rockwell C steel, indicated 27 times longer life; Test No. 2 (with coolant) —K7H showed 28 to 1 better performance (also on 29-32 Rockwell C materials) than the control carbide grade; Test No. 3 (without coolant)—cutting 37-39 Rockwell C steel, Grade K7H showed considerably higher resistance to wear than other carbides.

#### In the Shop—production runs:

Compared with non metallics, and long-established carbides on high-velocity finish machining of SAE 5135 170-207 Bhn., Grade K7H averaged 1000 gears per cutting edge while other carbides produced only 350 pieces; and ceramics broke down at 400-450 per edge.

These tests show that Kennametal Grade K7H is truly the "work horse" for high-velocity machining as we know it today. Why not ask a Kennametal tool engineer to demonstrate Grade K7H in your operations. Or write for complete information. Address Kennametal Inc., Latrobe, Pennsylvania.

\*Registered trademark





KENNAMETAL
...Partners in Progress





# Refractory brick structures last longer when laid with Harbison-Walker MATCHED MORTARS

Only by using the proper mortar can full benefit be realized from the furnace masonry. For longest service life the mortar used must match the characteristics of the brick. The brick and mortar should closely correspond with each other in refractoriness, thermal expansion, high temperature volume stability and other important properties. It is most desirable that they be compatible in chemical composition.

Harbison-Walker produces the many different kinds of mortars needed for widely diversified purposes. Those consisting of alumina and silica comprise the entire range from 99% alumina to 96% silica. All the basic mortars made of magnesia and chrome are included.

Here the essential properties of three leaders in their respective classes are briefly outlined.

#### HARBISON-WALKER REFRACTORIES CO.

AND SUBSIDIARIES

World's Most Complete Refractories Service

GENERAL OFFICES: PITTSBURGH 22, PENNSYLVANIA





#### HARWACO BOND

A non-shrinking, cold-setting, high temperature mortar. It is recommended for laying fireclay brick of all classes, high alumina brick and various insulating fire brick.

#### THERMOLITH

Cold-setting chrome base mortar, highly resistant to various corrosive fluxes. It is especially suited for use with basic refractories. In many applications where corrosive action is severe, THERMOUTH serves the purpose better than other mortars for laying many classes of alumina-silica brick.

#### VEGA BOND

A heat-setting silica cement of unusually high refractoriness. It is particularly adapted for laying Vega super-duty silica brick and other silica refractories for applications involving severe operating conditions.



#### **MATERIALS: Made Diamonds**

Presentation of fabricated diamonds to Smithsonian by GE is the occasion for announcement that pilot plant production is under way . . . Seen as possible \$200 million business

Industrial diamonds — unveiled last year as "a laboratory achievement"—are now being produced so successfully in a pilot-plant operation that "man-made diamonds will have an important impact on American industry and defense," GE says.

"Home-grown diamonds will give the U. S. an independent source of a vital commodity," Dr. C. G. Suits, General Electric vice-president and director of research, said in presenting to the Smithsonian Institute a cluster of the first diamonds made in the GE Research Laboratory at Schenectady, N. Y.

#### Could Be \$200 Million Business

Simultaneously with the presentation, General Electric's Carboloy Dept. revealed that man-made diamonds are now being produced in limited quantities at its Detroit pilot plant.



Scientist pours industrial diamonds in case for presentation.

"Industrial diamonds could become a \$200 million annual business within the next decade, if the cost of man-made diamonds can be brought down below those now being mined," J. S. Gillespie, manager of the diamond project at Carboloy, declared.

"Since 1954, when the first diamonds were made in the GE Research Laboratory in Schenectady,

#### WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 113. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

we have been making steady progress in bridging the gap between the first experiments and the production line" Gillespie said.

Dr. Suits explained, in his brief presentation talk, that "the commercial importance of diamond stems primarily from its incredible hardness, which is important in use as jewelry as well as in its industrial use for cutting and grinding."

#### Cutting Value Stressed

"The fascination and beauty of diamond gem stones sometimes obscure the real importance of this unique substance for manufacturing," he said. "Cutting and grinding operations are basic to a large segment of industry, and the speed and efficiency of these operations is a multiplier that exerts great leverage on the American economy. This fact becomes increasingly important as industrial technology produces ever stronger and harder materials in support of the inexorable competitive demand for higher temperature, higher speed, higher stress, and higher mechanical performance. It is especially in military and naval ordnance and aircraft manufacture that the unique properties of diamond play an important role."

The cluster of the GE Research Laboratory's first diamonds, presented to the Smithsonian, is about three-sixteenths of an inch in diameter and is composed of many tiny stones, the largest weighing less than a hundredth of a carat. A 100-carat sample of small manmade industrial diamonds surrounding the cluster was produced by the Carboloy pilot plant. The small crystals, occupying a total space of approximately one cubic inch, were divided into separate compartments on the presentation plaque, having been graded in accordance to established sizes used for different industrial grinding and polishing applications.

#### Contest:

### Entries sought in gray iron castings competition

Entries in the 1956 Gray Iron Castings Redesign Contest are now being received by the Gray Iron Founders' Society, Cleveland, sponsors of the contest.

This annual contest, now in its seventh year offers cash awards of \$500, \$250, and \$100 respectively for the first, second and third prizes.

Purpose of the awards is to encourage more extensive use of gray iron products formerly manufactured by competitive processes. Prize winning entries are used by the Society as authentic case histories in the production of its national advertising series which stresses the economy and performance of gray iron as an engineering material.

#### Open to Metals Personnel

Entries will be judged on the basis of (1) ingenuity of design, (2) cost savings, (3) performance advantage and (4) general applicability.

The contest is open to all persons engaged in the metal working industry and entries may be made jointly by two or more individuals. Awards will be made at the 28th Annual Meeting of the Society in Hot Springs, Va., on November 2, 1956.

All entries should be mailed to the Gray Iron Founders' Society, National City Bldg., East 6th, Cleveland 14.

#### How Biggest Toy Maker of West Cuts Seasonal-Change Costs With Flexible Plant Layout



To meet ever-changing production and tooling requirements, Mattel, Inc., uses Leveling Barry Mounts to mobilize its 22 open-back inclinable punch presses ranging from 10-to 60-ton capacity. Now the entire press-room layout is revised whenever the product line changes — because all 22 presses can be relocated in less than a day by three men and an industrial truck. The result — smoother flow of materials, less handling between operations, simplified expansion of press department, easier maintenance, and reduction of noise and vibration transmitted to other parts of the building. Mattel says, "Our Barry Mounts have paid off their investment several times over".

Ask Barry how YOU can boost output by mobilizing machinery.

#### ATF Proves Barry Mounts Cure Vibration Troubles in Testing Precision Gears

The gages on sensitive gear checkers at American Type Founders went crazy when lift trucks rolled by, and other machines sent vibrations down columns or through walls and floors. But now, with the testers "floating" on Leveling Barry Mounts, gear checking continues without interruption under the worst vibration conditions. For machine tools also, ATF has proved Barry Mounts make it easier to hold close tolerances and to get higher operating speeds by keeping vibration from affecting feeds, cutting tools, or work.

Ask Barry how YOU can protect precision machinery.



#### Here's How YOU Can Gain These Advantages

Write for our plant survey booklet M-556 that tells you where to look for these kinds of savings in your plant; then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.





795 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS



A call to any one of our seven warehouses will get you speedy service on your order... whether it's for alloy steel bars, billets or forgings, in any size, shape or treatment you need.

All seven warehouses are located in principal industrial areas. Each is modern and well-stocked, and staffed by expert metallurgists.

Call now if you need our own HY-TEN steels - "the standard steels of tomorrow", or standard AISI or SAE grades.

Or write for *free* copies of Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.



In Canada: Sanderson - Newbould, Ltd., Montreal and Toronto

#### WHEELOCK, LOVEJOY & COMPANY, INC.

126 Sidney Street, Cambridge 39, Massachusetts

#### Plating:

#### New bright nickel process undergoes field testing

Metal panels that have been finished in a new bright nickel plating process called Levelume are undergoing extensive field testing.

Steel panels that have been plated with various combinations of the new solution under a number of different conditions are being studied at Hanson-Van Winkle-Munning Co., Matawan, N. J. After plating, panels are weathertested on an exposure rack outside H-VW-M's laboratory there. Such testing may last months or years. while experts study the effect of weather conditions on the different finishes. In this way H-VW-M can determine which plating conditions and solutions will provide the best protection against corrosion and weather condititons.

Recently announced by H-VW-M, Levelume is reportedly the first bright nickel process to combine qualities of "full" brightness, high leveling and exceptional speed.

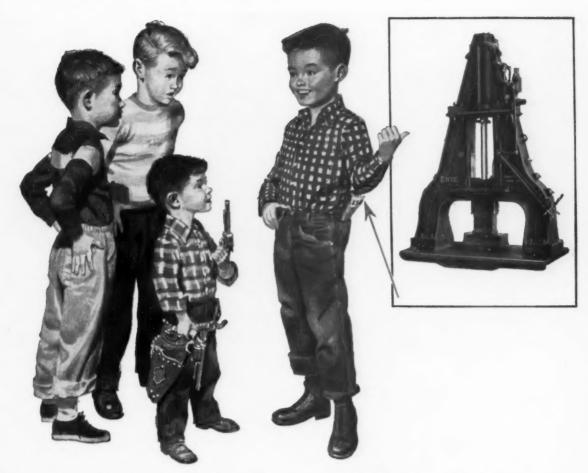


Panels are weather-tested after being plated with Levelume.

Field tested in several high-production installations, Levelume has shown, the maker states, deposition rates 100 pct higher than the fastest processes available today.

It has enabled one of the nation's leading auto parts manufacturers to more than double its production without investing in new conveyors, enlarging tanks, changing racking methods or increasing its labor force. Savings in equipment have amounted to over \$1 million.

Practically any existing nickel



"...and this, Rangers is my dad's brand new 10,000-lb. double frame hammer complete with redesigned valves, larger port openings through valves, and streamlined steam passages!"  $\setminus$ 

Pretty impressive stuff to a kid! But chances are your plant won't let the small fry near enough to even sneak a look at those big steam hammers. So here at Erie we've decided to give the kids a break. We've put out a book in their language—with pictures!—telling them all about forging from the crudest cave-man anvil and hammer to the latest hydraulic press. They'll learn a lot . . . and you . . . you'll be more a hero in their eyes than ever! Send now for your free copies of "Forgeland, U.S.A." Send, also, for descriptive technical booklets available on all Erie Hammers —Steam, Board Drop, Single Frame and Double Frame—yours for the asking—just write us.



#### ERIE FOUNDRY CO. ERIE, PA.

"OUR 61st YEAR"

FORGING HAMMERS . TRIMMING PRESSES . HYDRAULIC PRESSES AND ALLIED EQUIPMENT



let your Youngsters learn about FORGING

If you have a raft of kids—send for a raft of books:

ERIE FOUNDRY CO., ERIE, PA.

Send\_\_\_\_\_"FORGELAND U.S.A." Books to:

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# STAYS ON THE JOB

Continuously good service has always been dominant in building "Shaw-Box" Cranes of every type and capacity. The complete dependability of every part — from end trucks to load hooks — gives owners a bigger return over the years than "crane dollars" ordinarily buy. Advanced design and engineering and precision manufacture assure all-around safety, economical performance, and convenient, money-saving maintenance.

Shaw-Box originated many construction and operational features now generally accepted as standard in crane manufacture. The same creativeness is constantly evolving new "firsts" to provide even greater crane efficiency and long-life economy for every purchaser.

Shaw-Box offers the greatest variety of standard cranes available from a single source. Capacities range from 500 lbs. to 300 tons or more. So, plan for better crane service today and for years to come. Turn to Shaw-Box. We will gladly cooperate with your engineering consultants or your own staff. Your inquiry is invited. Write for Catalog 219.



120

"Shaw Box" CRANES

MANNING, MAXWELL & MOORE, INC.

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties, Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AM RETICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products

plating process can be converted to Levelume in a matter of a few days, according to H-VW-M. No special auxiliary equipment need be installed, except provisions for air agitation. Tanks only have to be thoroughly cleaned. Almost any rubber-lined tank previously used can be employed with the Levelume process.

Newly developed addition agents are of key importance in the new process. With these addition agents, it is possible to use an activated carbon pack in the filter for the plating solution. This continuously removes harmful organic contaminants. Consequently, costly and time-consuming periodic batch purification is not required.

Extensive tests have indicated that Levelume has: good ductility and controlled stress in either the compressive or tensile side; effectiveness within a wide current density range—from 20 to 150 asf; high leveling, scratch-filling characteristics; deposits with high surface activity; uniform brightness in recessed areas.

#### Coating:

#### Electronic structure seen key in nickel coatings

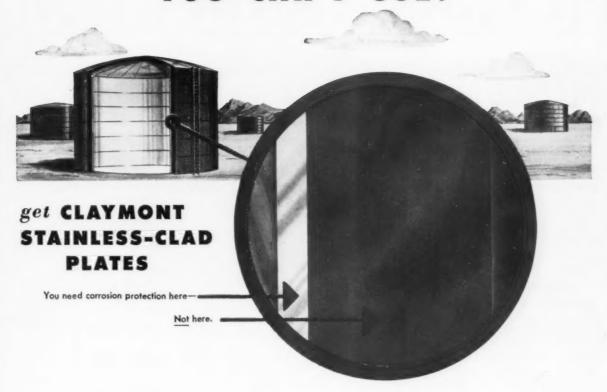
Research efforts to improve nickel-plating in order to increase the protective value of nickel coatings and to reduce their cost were reviewed recently.

Dr. W. A. Wesley, of The International Nickel Company, Inc., performed this function in the Hothersall Memorial Lecture before the Institute of Metal Finishing meeting at Blackpool, England.

Dr. Wesley is Manager of International Nickel's Research Laboratory at Bayonne, N.J. He was awarded the 1955-56 Hothersall Memorial Medal by the Institute of Metal Finishing for his outstanding work in the electrodeposition field.

In his lecture he applied recent theories of the electronic structure of the transition elements to explain the mechanism of dissolu-

## WHY PAY FOR STAINLESS STEEL YOU CAN'T USE?



You pay only for the stainless steel you can use when you buy Claymont Stainless-Clad Steel Plates. That's because these plates combine the low cost of the carbon steel backing with the corrosion resistance of the stainless steel cladding. This means that Claymont Stainless-Clad Steel Plates give the same kind of protection that you expect from much-more-expensive solid stainless steel.

Produced in our plant to exacting standards, these plates are manufactured with pains-

taking care under personalized supervision. What's more, our facilities provide definite assurance of prompt delivery.

It's quite likely that you can use this economical protection to great advantage in your fabrication of tanks, vessels, processing equipment and other applications. Why not get the full details today? Just contact our nearest sales office, or write to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware.



### Claymont Steel Products

Products of Wickwire Spencer Steel Division . The Colorado Fuel and Iron Corporation

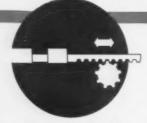
Abilene (Tex.) - Albuquerque - Amarillo - Atlanta - Billings - Boise - Boston - Buffalo - Butte - Casper - Chicago - Denver - Detroit - El Paso - Ft. Worth - Houston - Lincoln - Los Angeles
New Orleans - New York - Ookland - Odessa - Oklahoma City - Philadelphia - Phoenix - Portland - Pueblo - Salt Lake City - San Francisco - Seattle - Spokane - Tulsa - Wichita
CAMADIAN OFFICES AT: Toronto - Yangouver

#### OTHER CLAYMONT PRODUCTS

3415

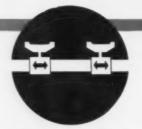
Carbon and Alley Steel Plates - Flanged and Dished Heads - Manhole Fittings and Covers - Large Diameter Welded Steel Pipe - Flame Cut Steel Plate Shapes
CF&L Lectre-Clad Nickel Plated Steel

# **Flexible Automation**



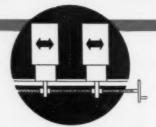
#### Variable Length of Feed Stroke

Changing from one job to the next is a simple matter in Transflex. Feed stroke is readily adjusted so that the part may be indexed any distance required by the number and size of the dies used.



#### **Adjustable Feed Fingers**

Simple adjustments are provided so that the feed fingers can be quickly respaced along the feed bar to accommodate varying feed lengths. Fingers may be easily changed to grip parts of different dimensions.



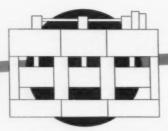
#### **Adjustable Cushion Positions**

Die cushions in a Transflex press are mounted on a track within the press bed. No matter where you want blankholding pressure, Transflex cushions can be moved laterally to that position by an adjustment mechanism outside the bed.



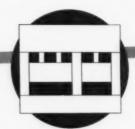
#### **Adjustable Knockout Positions**

Transflex presses are furnished with adjustable knockout positions. Air cylinders prevent the slide from picking up the part on the upstroke. Positive mechanical knockout is also provided in the event a part becomes so firmly seated in the dies that the cylinder remains compressed. Both cylinders and rods are adjustable left and right.



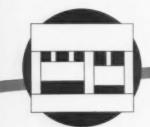
#### **Modular Construction**

An entirely new concept of press design and construction, modular press units provide the manufacturer with a means to alter the physical characteristics of the presses. A manufacturer can now have insurance against long range obsolescence of equipment. Modular construction provides a means to add or subtract crowns, beds, slides and uprights—to create a composite press tailored to the manufacturer's general requirements.



#### **Multiple Slides**

When a series of transfer operations presents extremely unbalanced load conditions, Clearing provides multiple slide construction. Two or more slides with completely different capacities are operated in a single press.



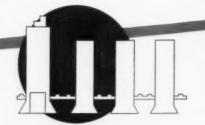
#### Skip Stroke

When two parts, which are similar except for one key operation, are to be produced simultaneously, Clearing offers a unique skip stroke action. One slide in a multiple slide press will skip every other stroke to allow the transfer mechanism to index twice. In this way a pair of parts are produced at every second stroke of the press.



#### Split Slides

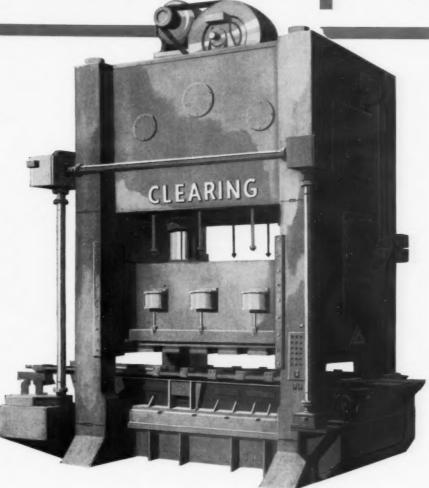
Clearing presses with split slides offer the manufacturers a means to obtain balanced production of pairs of parts where both parts are produced on the same press. Instantaneous die changing is possible by adjusting one slide up and the other one down. Split slide construction eliminates any effects of unequal loading of the slides.



#### **Lead Press**

A manufacturer wishing to automate a line of existing presses may purchase a Clearing lead press equipped with a fully adjustable Transflex feed mechanism. The feed is constructed in incremental units so that the press line can be modified—presses added or subtracted—at any time.

## the new CLEARING transflex press



### Transfer Feed Efficiency + Flexibility

Here at last is automation plus flexibility. The new Clearing Transflex makes it possible to take full advantage of transfer feed operation on a variety of work—to change over from one job to another with a minimum of effort. Stampings manufacturers have, in the past, looked on special purpose transfer feed presses as potential white elephants due to their

highly specialized function. These manufacturers will find in Transflex, an automated press designed to keep pace with design and model changes. Transflex is, in fact, so versatile that contract stamping shops, with their requirements for variegated production, are now taking advantage of the economies offered by Transflex operation.

1451

#### **CLEARING PRESSES**

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION . Division of U.S. Industries, Inc.

6499 W. 65th Street, Chicago 38, Illinois • Hamilton Division, Hamilton, Ohio

### Eliminate Operator Variables



# With the TINIUS OLSEN AIR-O-BRINELL\* METAL HARDNESS TESTER

Even inexperienced operators can make metal hardness tests quickly and accurately with the new air operated Tinius Olsen Air-O-Brinell. The possibility of over or under loading is virtually eliminated because the operator knows what load will be applied before the test is made. By adjusting a single control valve, the machine can be set to apply any standard Brinell load from 500 to 3,000 kilograms.

The Air-O-Brinell is the ONE metal hardness tester that combines shop ruggedness with laboratory accuracy... plus unmatched ease of operation. In addition, this lightweight tester can be moved and used anywhere—in the lab or on the production line.

Get the facts about the Tinius Olsen Air-O-Brinell the modern hardness tester that makes all others obsolete. Write for Bulletin 52.

\*Patents Applied for



### TINIUS OLSEN

TESTING MACHINE COMPANY
2120 EASTON RD. WILLOW GROVE, PA.

Testing and Balancing Machines

TECHNICAL BRIEFS

### "Basic part of the plating is electrode reaction . . ."

tion of nickel, with particular reference to the industrial practice of nickel-plating.

A basic part of the nickel-plating process is the electrode reaction by which nickel dissolves, Dr. Wesley said, adding that this reaction is also significant because it is the primary step in the corrosion of nickel alloys.

In spite of the importance of the reaction, the mechanism by which it takes place is not fully understood and the behavior of nickel as demonstrated by its polarization curves requires more explanation, the lecturer remarked. In a field somewhat remote from electrochemistry, namely, that of solid state physics, recent advances have brought forth new ideas regarding the electronic structure of metals. These ideas have given Dr. Wesley what he believes to be the key to an explanation of the behavior of nickel anodes in nickel-plating.

#### Atomic Structure Important

He proposed in his lecture a theory that the electronic structure of the nickel atom, as it is believed to exist in the metallic state, plays a decisive part in the mechanism of the reaction by which nickel dissolves. If the three kinds of nickel atom cores which exist in nickel metal require different energies of activation for reaction, the medallist said, then this can be used to explain most of the unusual features of the behavior of nickel anodes which have puzzled electrochemists for decades.

#### Practical Benefits Seen

The theory should also lead to new developments in the practical as well as the scientific aspects of the nickel-plating process, according to the speaker. It is expected to stimulate research in the field of corrosion and there is reason to believe, Dr. Wesley remarked, that some puzzling features of the corrosion and passivity of not only nickel but other metals and alloys will be explained.



### for DRAW DIES is PRODUCTION NEWS!

Write for a copy of the OTTAWA 60 BLUE SHEET

This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.

ADDRESS DEPT. A-771

In fact, this exclusive Allegheny Ludlumdeveloped die steel is mighty good news for any user of draw dies. Ottawa 60 is a high-carbon, high-vanadium analysis, initially designed for the primary purpose of drawing stainless steel.

In that service, Ottawa 60 does just exactly what it was developed to do: it performs without galling or pickup, and shows exceptional wear-resistance—as a long list of successful applications will prove to you. Two of them are illustrated above: a stainless hinge and a stainless sundae server.

But Ottawa 60 is a top performer on any draw die application! Also illustrated above are the two draws on a transformer housing of .037" gauge SAE 1010 strip. After more than 25,000 pieces—over 12 times any previous runs—there was still no sign of pickup, or of wear on the Ottawa 60 punch or die.

This analysis can solve your draw-die problem jobs—or reduce your costs on almost any drawing operation. • Call on our Mill Service Staff for any assistance. Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pa.

For complete MODERN Tooling, call Allegheny Ludlum



#### Methods:

Silicones protect metal samples from moisture

How a leading steel company used silicones to protect samples from moisture may be of interest to salesmen of other lines who have a similar problem.

It was found that when samples. or etchings cut from steel bars. billets, slabs or sheets, were handled by human hands, moisture was transferred to their surfaces. The inevitable result was discoloration and rust, which meant unattractive samples to show pros-

#### Thin Coating Used

Hearing that the silicones are noted for their ability to repel moisture, this steel company tried a very thin coating based on an X-31 silicone made by Silicones Div., Union Carbide and Carbon Corp., N. Y. Salesmen report that the silicones are effective and long-lasting.

#### Machining:

Adding automatic components benefits standard borer

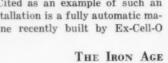
By the addition of relatively inexpensive automatic components to standard precision boring machines, states one firm, manufacturers can quickly benefit by the cost-savings



Borer processes steel sleeve for auto oil pump drive.

made possible by automatic machine production.

Cited as an example of such an installation is a fully automatic machine recently built by Ex-Cell-O





JOT NAME, TITLE AND ADDRESS IN THIS SPACE

TO START YOUR FREE NELWELDER SUBSCRIPTION



ALUNDUM\* TUMBLEX "A" ABRASIVE, for general barrel finishing. Can perform several operations in one: removes flash, heat treat scale, tool marks, deburrs, forms radii, and finishes to desired microinch. Available in eleven sizes.



TUMBLEX "N" ABRASIVE, for high lustre, especially on die castings and soft metal. Rounded uniform shape brings out the most desirable color of the finished parts. Available in seven sizes.



ALUNDUM TUMBLEX "T", a bonded, triangular shape, fast cutting tumbling abrasive for special shaped parts. The triangular shape prevents wedging in work slots or holes. Available in four sizes.

# Barrel finishing is producing sensational results

... and 3 Norton TUMBLEX Abrasives lead you to the best method

Here are three steps that may yield some interesting advantages to you.

First, check your present method of deburring and descaling. If it is slow and costly, it is quite likely that barrel finishing can do it better, faster and cheaper.

Second, check the three Norton Tumblex materials shown above and decide if their properties would be suitable for your requirements.

Third, send us some work samples

with a description of the results wanted—and include a finished piece. We will tumble the samples and return to you with full information covering the material and method used. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone directory, yellow pages. Behr-Manning, Troy, N. Y., a division of Norton Company. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G-308

\*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries



Making better products... to make your products better

NORTON PRODUCTS: Abrasivas · Grinding Wheels · Grinding Mathines · Refractories BEHR-MANNING PRODUCTS: Coated Abrasivas · Sharpening Stenes Pressure-Sensitive Tapes



## Solving troublesome problems

Here's another good reason why Vulcan tool steels are ahead—for present Vulcan customers and for you.

Algonquin Tool and Mfg. Company had a problem of making dies with absolute minimum distortion in hardening. Results were outstanding—heat treat distortion was negligible—close tolerances were met with a minimum of grinding after hardening—tools gave 100,000 stampings per grind.

If you have a tool steel or die problem—look ahead to Vulcan. A representative is nearby.

#### Vulcan Crucible Steel Division



### H. K. Porter Company, Inc.

Aliquippa, Pennsylvania

Offices and warehouses in Pittsburgh, Newark, Cambridge, Boltimore, Birmingham, Buffalo, Detroit, Lansing, Chicago, Milwaukee, St. Louis, Paterson (N. J.), Bridgeport Corp., Detroit, for a large automobile manufacturer. The basic unit in this design is a standard precision boring machine. The workpiece it processes is a steel sleeve for an automobile oil pump drive. Two grooves are cut in the part at a net production rate of 250 pieces perhour.

Expansion of one such unit into a battery of duplicate automatic machines can be worked out according to anticipated production needs, says Ex-Cell-O. When joined by transfer mechanisms, this machine grouping assumes the form of a high-production automation assembly.

Two important objectives are served by this approach, Ex-Cell-O explains. First, a realization of the savings commonly experienced with automatic machining. Second, a smooth transition from older and slower operational methods to automation, with investment controlled at all stages. Both objectives are possible to attain by small and medium-sized plants as well as by larger companies.

#### **New Books:**

"Aircraft Production Methods," by Gordon B. Ashmead. A virtual step-by-step, personally conducted tour through a number of the large aircraft companies of the U.S. Beginning with the master plaster pattern, it goes on from there to the foundry where dies to form metal are made; to the forming machines; the drop hammer; and the turning of sheet metal stock into aircraft parts. Advanced methods of heat treating are covered as well as the way surfaces are prepared to withstand the elements. Over 300 photographs are Chilton Co., Book Div., Chestnut and 56th Sts., Philadelphia 39. \$7.50. 293 p.

"Introduction to Plasticity," by Aris Phillips is an introductory text on the subject of metal plasticity, written from the point of view of the stress analyst. Sections are given over to the calculation of the collapse load, the mo-

Even truer today

We ran this

B&W Insulating

**Firebrick** 

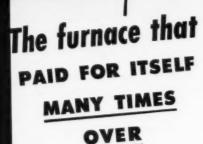
advertisement in 1947

Only in main arch

approximately 2 feet from each end of the

furnace

ito courtesy Sun Shipbuilding & Dry Dock Company



Still lined with its original B&W Insulating Firebrick after 15 years of normalizing and stress-relieving service, this furnace is giving exceptional performance. Despite the added strain of the rigorous war years, the 80,000 B&W IFB used to line sides, ends and arch have required no appreciable maintenance!

It is no wonder the operators can report: "This furnace has paid for itself many times over."

For furnace performance that assures highest production at lowest cost, even after years of grueling service, you can always count on lightweight B&W Insulating Firebrick. Your local B&W Refractories Engineer will be glad to help you select economical B&W Refractories for your furnaces.



# B&W REFRACTORIES PRODUCTS:

B&W Allmul Firebrick . B&W 80 Firebrick . B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars

**B&W** Silicon Carbide

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WILCOX CO. REFRACTORIES DIVISION GENERAL OFFICES: 161 EAST 42ND ST., NEW YORK 17, N.Y. WORKS: AUGUSTA, GA.

# MICROHONING\*

# Generates ...

# ACCURATE, ROUND, STRAIGHT SURFACES

Truly round, straight surfaces are generated by the application of fundamental principles on which the Microhoning process and equipment design are based:

The combined reciprocating and rotating motion of the tool act on the full length of the bore on every stroke.

The self-dressing abrasive assures sharp grits and cutting at all times.

The tool and bore automatically align themselves.

The feed-out of the tool is positive with equal pressure in all directions from the center line.



All out-of-roundness is removed by the expanding abrasive "cylinder" formed by the rotating tool. Only the tight areas are abraded until all areas have the same radius from the axis.



Wavy or snaky surfaces are made straight by the long abrasive sticks shearing off the crests of the waves.



In tapered bores the abrasives cut only in the tight area until the cylinder has the same diameter throughout its full length.





#### ACTUATING LEVER

Steel Forging • 58 to 60 Rockwell "C"
Bore out-of-round and tapered .0015 to .0025 inch.

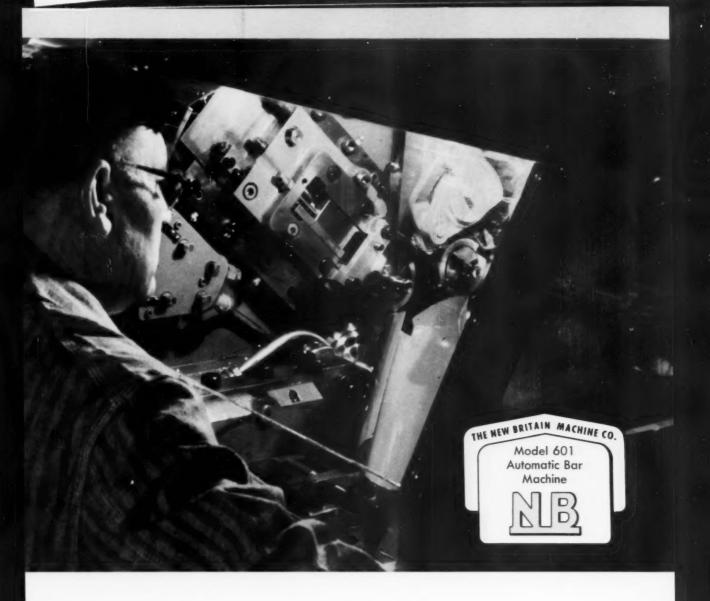
Microhoning reduces error to less than .00015 inch

Removing approx. .005 inch stock
Production—130 pieces per hour
Machine—Model 705-2 Hydrohoner

\*MICROHONING = Stock Removal + Geometry + Size Control + Surface Finish

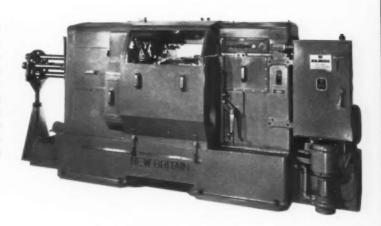
# MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE . DETROIT 38, MICHIGAN



## 8 tons of metalworking efficiency

If you are interested in absolute minimum cost per piece on either long or short runs, investigate the Model 601 New Britain bar machine. Massive enough and powerful enough to handle your new high-speed cutting requirements. Super-high spindle speeds, maximum versatility, optional universal tool slide cam which eliminates cam change time. With the Model 601 on your floor you have "the shortest distance" between bar stock and finished piece. Write for Bulletin 6H.



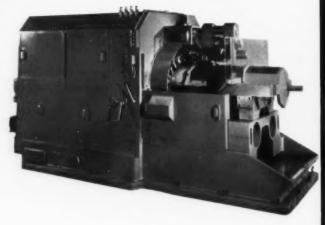


# new New Britain chuckers handle bigger work pieces

If you know chucking machines you know the world-wide reputation of New Britains for accessibility, versatility, quick setup and sustained high production of precision parts.

Now new New Britain models enable you to apply this high productivity to pieces with chucking diameters up to ten inches on eight-spindle machines, twelve inches on six-spindle production and fifteen inches on four-spindle work.

Check this practical approach to more profitable production with your New Britain representative, or write for Bulletin 3R. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



#### TECHNICAL BRIEFS

ment-curvature diagram, bending with axial force, deflections, stressstrain relations, collapse under combined stresses, and work-hardening. The appendix gives proofs of the theorems presented. The Ronald Press Co., 15 E. 26th St., New York 10. \$7.00, 226 p.

"Mechanical Engineering Practice," by Charles E. Shoop and George L. Tuve. Fifth edition of a laboratory reference text in this field, reflects the trends toward greater use of electrical instruments and transducers and the study of the dynamics of the processes of flow and heat transfer. Sections of the book deal with mechanical and electro-mechanical measurements, automatic controls, oils, friction and lubrication, transfer of heat, measurement of properties of fluids, fluid flow and fluid dynamics. Others covered are pumps and compressors, combustion, heating, ventilating and air conditioning, refrigeration and cooling, and internal combustion engines. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36. \$7.00. 460 p.

"High Temperature Technology," is an account of recent developments in the high temperature fields as prepared by thirty-five workers in this field. Sponsored by the Electrochemical Society and edited by I. E. Campbell, the book describes new materials, covers methods used in production and explains techniques for measuring properties. John Wiley & Sons, Inc., 440 Fourth Ave., New York 16. \$15.00. 502 p.

"Modern Naval Architecture," by W. Muckle first discusses the factors which affect the design and efficiency of different types of ships. An analysis is then presented of such problems as resistance, stability, propeller design, accommodation, prevention of fire and elimination of rolling and vibration. An account is given of the design of hull form and the structures of ships, including the use of electric-arc welding and new materials such as aluminum alloys. Philosophical Library, 15 E. 40th St., New York 16. \$4.75. 148 p.

# Ask how to cut costs with conveyors



TV chassis move along Standard slat conveyor at right center. Job-tailored design assures uninterrupted, smooth work flow . . . helps manufacturer achieve high degree of automation despite complexity of operations.

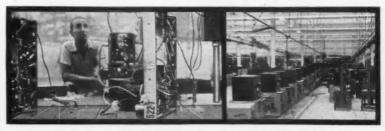
## Mile-long conveyor system speeds TV production line

IN this TV plant, Standard engineers designed and installed more than 2800 ft. of belt and slat conveyors as part of a mile-long conveyor system.

It's a typical example of how Standard engineers will work with you and your engineers to increase automation, cut costs through more widespread use of conveyors.

And, because Standard produces a

wide range of permanent or portable gravity and power conveyors roller, belt, slat, chain, wheel push-bar and sectional types - you can be sure their recommendations will be unbiased. When you plan any materials moving system, be sure to call or write STANDARD CONVEYOR COM-PANY, General Offices: North St. Paul 9, Minnesota.





Contact the Standard en-gineer listed in your classified phone book. Or, write for free catalog. Address Dept. M-5.

Left photo shows closeup of slat conveyor. Note integral electric sockets for circuit testing. At right, completed sets move along Standard wire-mesh floor belt.



Sales and Service in Principal Cities.



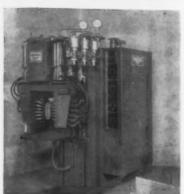
New and improved production ideas, equipment, services and methods described here offer production economies...for more data use the free postcard on page 113 or 114.



#### Interaction of rams gives broaching unit smoothness

Outstanding feature of a line of 15ton capacity dual ram vertical broaching machines is described as their smoothness. This is achieved, maker states, through helical pinion rack drives and balanced power loading made possible through the inter-action of the ascending and descending rams. This power flow to the tool reportedly gives broached surfaces improved finish with 50 to 100 pct faster cutting stroke. The pinion-rack drive is powered by a variable speed dc motor powered by a motor generator set. While one ram is on the cutting stroke, the other ram is returning. Five basic models are available with stroke lengths of 54, 66, 80, 90 or 100 in. Hardened and ground box-type or Vee ways are available on all five models. Broaching speeds up to 80 ft or more per minute as required are available. Ram speed is infinitely variable between minimum and maximum limits to give broaching speeds for any particular operation or material. Broach life is increased due to smooth operation, according to the manufacturer. Colonial Broach & Machine Co.

For more data circle No. 26 on postcard, p. 113



#### Spot weld unit makes twelve spots at one time

This multiple spot welding machine, now welding two resonator baffles into a muffler shell, makes twelve spots at one time to secure each baffle by way of twelve separate welding electrodes. The main welding transformer has a rating of 75 kva. Heat control is by means of an eight step tap switch. The unit's upper arm assembly contains a fixture for mounting the 12 electrode guns to the contour of the piece part. This assembly has two seperate weldments, or a left and right hand bank

each containing 6 standard guns. The lower arm assembly is contoured to match the muffler shell, however, the insert is slightly undersize to facilitate easy loading. Sequence of squeeze, weld, hold and off is initiated by a limit switch as the part is moved into position on the lower arm. Electrode gun firing is in a counter clockwise direction. Sheet steel baffles are 0.030 in. and muffler has two thicknesses of 0.018 steel sheets. Sciaky Bros., Inc.

For more data circle No. 27 on postcard, p. 113



#### Oscillating unit for regular or electrolytic grinding

This oscillating carbide tool grinder is adapted for either conventional grinding or, when connected to a power unit, electrolytic grinding. Its outstanding feature is described as the oscillating spindle, which relieves the operator of the effort of manipulating the tool. Tool is held in stationary position, while the oscillating wheel does the work for him. Spindle is described as assuring uniformly flat grinding and making possible longer life for the diamond wheel, as the face is being

uniformly worn and frequent dressings are not required. Wheel oscillation has two variables—oscillations per minute and length of stroke. Both are controlled by handwheels located on the front of the machine for operator convenience. They can be adjusted between 0 to 70 per minute. Length of stroke can also be varied as required. Self-contained unit for coolant is mounted inside the machine's base. Hammond Machinery Builders, Inc.

For more data circle No. 28 on postcard, p. 113

# HAMIKLEER

\*REG. U.S. PAT. OFF

OF IX COOLANTS TESTED!

DILUTION:
1 to 70 PARTS WATER

# THE TEST

A metalworking firm, well known for precision work and outstanding technical skill, tested 30 different brands of coolants. They wanted one coolant that would give excellent performance on grinding, threading, boring, turning and honing operations on cast iron and hard and soft steels.

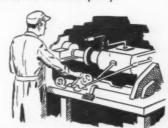
At the end of the test, which was one year, HAMIKLEER was rated best by a wide margin, outperforming all others even in hot, humid summer weather. It is now the standard all-purpose coolant for the company.

HAMIKLEER is an odorless synthetic, clear liquid...without oils of any kind. It replaces soluble oils, dissolves in any kind of water to make a clear, thin, odorless, rancid-proof lubricant and it will not foam, decompose, gum or become tacky. Here's what this product will mean to you:

# ONE COOLANT TO REPLACE MANY DIFFERENT PRODUCTS

HAMIKLEER can be used for practically any metal cutting and grinding operation—on cast iron, hard and soft steels. It even replaces kerosene for honing and eliminates the fire hazard.

FINE SURFACE FINISH...LONGER TOOL LIFE HAMIKLEER keeps work cool, clean and plainly visible at all times. And, because of its excellent lubricity and anti-weld properties, it assures fine surface finish and increased tool life.



There were no signs of rust or rancidity when HAMIKLEER was used on many metalworking operations even during hot, humid weather.

#### RUST PREVENTION

The one year test—and other tests—prove that HAMIKLEER protects metal from rust even in hot, humid weather. In addition, it does not turn rancid.

#### NO DISPOSAL PROBLEM

HAMIKLEER can be run down drains without danger of gumming or clogging, providing oils do not get into the mixture.

**TEST HAMIKLEER** on your own metalworking operations at our expense. Send for a free sample today.



## HARRY MILLER CORP.

Original Products and Processes Since 1936

4th and BRISTOL STS. • PHILADELPHIA 40, PA.

Service Representatives in Principal Cities

#### Automatic cabinet type cleaning unit is compact

Developed for cleaning small parts, this new automatic machine is described as adaptable for washing. rinsing and drying in the metalworking fields. Both small and large plants can use the unit either as a single machine installed in one or more locations or in groups of two. three, four or more installed in one location as required. Capable of processing up to 40 baskets of parts per hour, the unit cleans two baskets or other loads of parts in one load. Maximum overall size of each basket is 211/2 in. long, 143/4 in. wide and 14 in. high. When baskets

are loaded into the cabinet and the door is closed, an adjustable, automatic time cleaning cycle is started. It includes the following sequence: hot recirculated cleaning solution spray for 30 seconds; hot water rinse spray for 60 seconds; and a drain-dry for 90 seconds. At completion of the cleaning cycle the door opens automatically and baskets or racks of parts are unloaded by the operator. Heating of the wash solutions and rinse water can be done either by gas, oil or electricity. Ransohoff, Inc.

For more data circle No. 29 on postcard, p. 113



#### Button touch provides desired spindle speeds

Desired spindle speeds can be rapidly achieved by a simple touch of a button on this second operation machine. Spindle speed changes for rates between 230 and 3500 rpm can be made without stopping the machine. Operator can locate the best speed for the most efficient chip removal and surface finish by simply pushing the "faster" or "slower"

button. The unit can chuck partially finished parts and rapidly do close tolerance forming, boring, drilling, threading and facing. Another feature of the unit is a special collet closer to open or close collet or step chuck while machine is operating. The collet utilizes ball-bearings. Hardinge Bros., Inc.

For more data circle No. 30 on postcard, p. 113



#### Air fixture lock gives split second clamping

Split second clamping on six distinct applications are described as possible on a universal air fixture lock. The photograph here shows two of the units mounted on a fixture to lock work pieces in position for a drilling operation. Other applica-

tions include moving one part of a fixture against another; pushing work pieces into cutters; loading or ejecting work pieces automatically and pressing parts into a work piece. Wilton Tool Mfg. Co., Inc. For more data circle No. 31 on postcard, p. 113



#### Separator and filter uses flat magnetic field

Described as the largest of its kind manufactured, this unit provides removal of sludge and abrasives by the use of a flat magnetic field of permanent magnets. Since certain particles such as wheel abrasives do not respond to a magnetic field, the maker, for maximum efficiency, has combined the separator with a paper filter. Particles remaining in the liquid pass down to the filter and are retained on the surface for removal. Industrial Filtration Co.

For more data circle No. 32 on postcard, p. 113



#### Wheels for polishing metal with portable hand tools

These wheels, which have the same basic design as larger polishing and grinding units introduced previously by this firm, are composed of die-cut pieces of coated abrasive cloth, bonded with resin and locked into a hub. The units are particularly suited, the maker claims, for

work in the appliance, stainless and sheet steel fabricating, metal polishing, plating and tool and die industries. They are recommended for rust or dirt removal, blending and weld polishing. Minnesota Mining and Manufacturing Co.

For more data circle No. 33 on postcard, p. 113

# **AXELSON**

## production and maintenance news

AXELSON MANUFACTURING COMPANY / DIVISION OF U.S. INDUSTRIES, INC. / 6160 SOUTH BOYLE AVENUE, LOS ANGELES 58, CALIFORNIA

# New 32" lathe features 81 standard feeds...simple selection of 45 different threads

To provide users with utmost flexibility in machining, the new Axelson 32" heavy-duty lathe has 81 feeds ranging from .005" to .351" per revolution of the spindle. Forty-five threads, from 1 to 30 per inch, are possible with the standard gear box.

By simple substitution of gears in the end train, odd threads or leads and ranges of metric module and diametrical pitches can be obtained. Two levers control the selection of feeds and leads. One lever divides the feed range into four groups. The second lever selects the feed or lead desired.

convenient carriage are located on the apron convenient to the operator. Controls for both cross and longitudinal feeds are through easily operated drop levers which actuate serrated clutches to insure smooth operation and maximum power transmission. Longitudinal rapid traverse in either direction is controlled from the left side of the apron. Headstock control, to start, stop and reverse the spindle, is located on the right side of the apron.

RIGID, TWO-SPEED TAILSTOCK. The two-speed tailstock provides a fast rate of movement where it is desirable to bring the tailstock center up to the work-piece as rapidly as possible; or a slow powerful movement of the spindle for feeding drills, reamers and other tools held in centers.

The new Axelson 32" lathe has many other outstanding features. For more information on it, the new 25/16 and other Axelson tool room, heavyduty, sliding bed and hollow spindle lathes, write for catalogs I5-5507 and 5504.

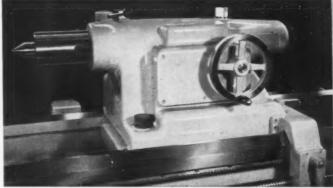




TOTALLY ENCLOSED GEAR BOX. All gears run in continuous oil bath. Gears and shafts are mounted on anti-friction bearings for smooth, quiet operation.



VIBRATION-FREE CARRIAGE. Carriage locates on hardened steel front-way and rides on wide, flat hardened steel rear-way. Result is rigid, vibrationless turning on even heaviest jobs.



ONE-PIECE TAILSTOCK. Tailstock is rugged, one-piece design which transmits extreme tool loads to bed. Tailstock can be clamped to bed for extremely heavy jobs.



# **Foote Manganese Sulphide**

Producing high-sulphur free-machining steels involves fewer headaches since Foote developed Manganese Sulphide. Now both manganese and sulphur are added to the melt as a single, easy-to-handle lump material without evolving obnoxious fumes. In every respect, Foote Manganese Sulphide improves steel quality and lowers production costs with these extra advantages:

- improved hot rolling behavior
- lower conditioning costs
- fewer diversions
- low carbon content

Manganese Sulphide is just one of the additives developed by Foote metallurgical engineers. Working closely with the steel industry, Foote is constantly working on new and improved alloying agents that fulfill specialized requirements.

If you are interested in the production of free-machining steels, or if you have a particular alloying problem, it will pay you to contact Foote. Our experience and facilities are at your command.



#### FOOTE MINERAL COMPANY

438 Eighteen W. Chelten Avenue Philadelphia, Pa.

RESEARCH LABORATORIES: Berwyn, Pa.

PLANTS: Exton, Pa.; Kings Mountain, N.C.; Sunbright, Va.; Knoxville, Tenn.

#### **Drilling machine**

A new automated 12-station drilling machine combines the features of an in-line transfer machine with those of a large center column rotary index machine. The electrically controlled, hydraulically operated machine drills, spotfaces, reams and deburrs holes in a 39-in. long, 2%



in. OD bent tubular steel automotive frame cross member at a rate of 200 pieces per hr. Automation devices are included in the unit to transfer the parts from the in-line machine to the indexer as well as to unload the parts from the index machine. Expert Automation Machine Co.

For more data circle No. 34 on postcard, p. 113

#### **Malfunction detector**

Suitable for use on any type of rotating equipment subject to mechanical malfunctions, this vibraswitch is mounted in an oiltight housing with an external reset and locking mechanism. Monitoring vi-

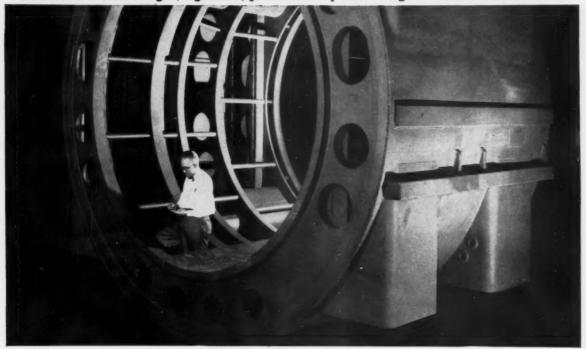


bration and actuating an alarm or causing shutdown when trouble occurs, the unit is used to detect malfunctions such as bearing roughness, unbalance, broken blades and bent shafts. Mechanism is fail-safe, does not depend on external power source and requires no maintenance. Beta Corp.

For more data circle No. 35 on postcard, p. 113



WELDMENTS for strength, lightness, predictability and design freedom - at lower cost!



**ELECTRICAL GENERATOR FRAME:** End section of a three-piece stator frame built by Lukenweld for General Electric. This type of

welded structure provides remarkable rigidity and strength at critical points with a minimum of weight.

# A UNIQUE COMBINATION OF ADVANTAGES

Lukenweld welcomes orders for the really big and challenging weldments. The most extensive facilities and longest experience of any commercial weldery in the country combine to save you money and time. Here's how...

**DEPENDABILITY** The predictability and rigidity of welded structures plus Lukenweld's specialized knowledge of design and materials selection assures equipment that will perform efficiently, longer.

RELIABLE SOURCE OF MATERIALS Carbon, alloy and clad steel plates in the widest range of types and sizes available anywhere are obtainable "right next door"—from the Lukens rolling mills.

**CONSULTATION SERVICE** Metallurgical, design engineering, related services are available on your job.

**FINISHING FACILITIES** Modern heat treating, machining and other finishing facilities are your assurance of complete quality control from steel plate to finished

weldment-ready for assembly in your equipment.

EXPERIENCE Lukenweld, the first commercial weldery in the U.S., pioneered many advances in welded construction. Knowledge and craftsmanship gained through this experience make Lukenweld unusually qualified to meet your weldment needs.

FOR INFORMATION on how Lukenweld can answer your particular weldment problems or for a copy of the informative booklet, "Weldments by Lukenweld," write on your company letterhead to Manager, Marketing Service, 818 Lukens Building, Coatesville, Pa.

# LUKENWELD



A DIVISION OF LUKENS STEEL COMPANY
COATESVILLE, PENNSYLVANIA



#### Gas chromatography unit simplifies analyses

Using the principle of elution with either liquid partition or solid adsorbents, this analyzer provides an accurate breakdown of many different gas and liquid mixtures with a clear-cut resolution of all components. The maker stresses that analyses previously requiring complex equipment and taking a longer time to complete have been reduced to ordinary laboratory routine. The unit accommodates two columns for

maximum flexibility and economy in use. Two identical or different samples may be in work at the same time, or one column may be conditioned and charged for reuse while the other column is analyzing. The columns may contain different adsorbents and be operated at different temperatures. Direct acting detector cell is used for maximum sensitivity. Burrell Corp.

For more data circle No. 36 on postcard, p. 113

#### Large fork lifts

A new series of heavy duty fork-lift trucks in the 12 to 15 ton range has been announced by one manufacturer. The four models offered lift 12, 13, 14 and 15 ton respectively. Gasoline driven, they can be supplied for diesel operation. In lifting



rated loads their speed is standardized at 50 fpm to a height of 10 ft. Forks, standardized at 48 in., are variable in width from 0 to 100 in. All models have a six degree forward and ten degree rearward tilt. Gerlinger Carrier Co.

For more data circle No. 37 on postcard, p. 113

#### Fence coater

A lamb's-wool roller designed expressly for fence maintenance has been developed which features an extra-long  $1\frac{1}{2}$  in. nap. The nap reaches right around the fence wires and coats about 70 pct of the opposite side of the wire in one stroke. The  $1\frac{1}{2}$  in. length was determined as the length that gives the greatest wrap-around action without matting down on adjacent fence wires. Oversize sleeve diameter is mentioned as giving the roller greater carrying capacity. Rust-Oleum Corp.

For more data circle No. 38 on postcard, p. 113



The Edland 2F instant change variable speed feature lets you find correct drilling speed under practical on the job conditions. Saves valuable production time. No gear or belt changes necessary. Increases tool life by using correct drilling speed for each job requirement.

Standard or Special Models, 1 to 8 Spindles, 8", 12" or 15" overhang – capacity to 1.14". Available with Power Feed, Reversing Motor Tapper, Lead Screw Tapper, and Back Gears. The job . . . drilling  $\chi_{\rm j}^{\prime\prime}$  hole  $1\chi_2^{\prime\prime}$  deep in X1020 steel. The Edlund Variable Speed machine drilled 135 pieces per hour compared with 108 pieces per hour for standard machine production. The 25% increase in production reduced costs \$1280.\*

Write for Bulletin #140, a colorful, illustrated booklet describing the Edlund 2F. Specifications and quotations prepared promptly on request ... with no obligation on your part.

\*Case history folder #SF on request

EDLUND MACHINERY COMPANY

138

THE IRON AGE

#### Torque converter truck

Described as the first truck in an industrial class which incorporates a torque converter, this 11/2 ton unit has a top speed of 12 mph with special gear ratios for higher speeds available. Its powered by a 15 hp air cooled engine direct coupled to a transmission consisting of a three element hydraulic torque con-



verter and directional clutches. Engine and transmission are coupled to the differential with an automotive type drive shaft. Operation is reported simple and smooth. Driver sets the directional change lever in either forward or reverse, presses the accelerator to move and presses the brake pedal to stop. Prime-Mover Co.

For more data circle No. 39 on postcard, p. 113

#### Thread roll attachments

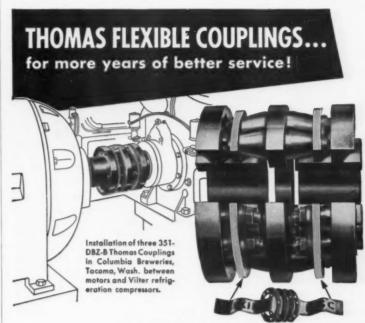
Three universal thread rolling attachments for roll forming a wide range of threads and oil grooves incorporate all of the features of other models of the firm's line of thread rolling attachments. These are described as rigidity, simplicity of adjustment and the exclusive cross-axis principle that allows low cross slide pressure. All these thread rollers have one roll in fixed position in relation to work spindle. and the opposite roll is readily adjusted by the operator on the machine. The universal Model BB thread rolling attachment will roll over 70 different threads from 1/4 to 1 in. diam. Universal Model CB will roll 63 threads whose diameters range from 6/32 to 5/8 in., and universal Model DB will roll 53 different threads ranging from 7/8 to 11/4 in, in diameter in increments of 1/16 in. Pitch is in 10-12-14-16-18-20-24-28-32. All three models can be equipped with hydraulic cross slide. Salvo Tool & Eng. Co.

For more data circle No. 40 on postcard, p. 113

#### **Balancing** unit

This new balancing machine handles single and dual motor truck and aircraft wheels, crankshafts, clutches, armatures, flywheels, impellers, and blower wheels. It gets its "all-purpose" designation from the fact that it balances a wide range of rotating parts weighing from 25 lb to 1000 lb, and measuring up to 60 in. in diameter. The model is available with a 2 hp Varidrive unit which delivers spindle speeds of approximately 275 to 1900 rpm. The Varidrive is described as especially desirable for balancing armatures, rotors, pump impellers, flywheels, clutches and similar elements. This unit makes it possible to balance and test a 7.50 x 14 aircraft nose wheel assembly rotated at a speed equivalent to 160 mph. The basic model includes equipment for handling single and dual truck wheels, Bear Mfg, Co.

For more data circle No. 41 on postcard, p. 113



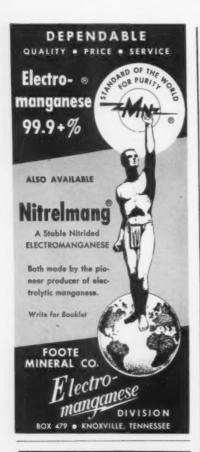
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalianment as well as free end float.

FACIS		
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.	
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.	Thomas Couplings are made for a wide
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.	range of speeds, horsepower and shaft sizes and can be assembled or
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.	disassembled without disturbing the connected machines, except in rare instances.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.	
		de de



#### THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World WARREN, PENNSYLVANIA, U.S.A.







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3042-3058 W. 51st Street, CHICAGO, ILL Phone: Grove Hill 6-2600 7 Fenner Street, Providence, R. I. Phone: Gaspee 1-5573, 1-8573 Metal laundry

This batch type, mechanically agitated cleaner automatically washes, rinses, rust-protects and dries small metal parts such as acorn nuts, screw machine parts and fittings. It not only removes oils and other industrial soils, the maker says, but troublesome loose chips as well thus eliminating hand scrubbing and air blow off. Dirty parts to be treated are loaded in a revolving drum, attached to an air cylinder. The drum is lowered into the "Roll-O-Matic metal laundry" tank. Parts are ro-



tated in the wash solution for a predetermined period, followed by a spray rinse. Then follows a rotating anti-rust treatment and finally a hot air dry. Washing and antirusting solutions are salvaged for reuse. After completion of the final liquid or dry stage the drum is automatically raised. The unloading chute, which is attached to the drum, then lowers. The operator opens the door on the drum and the parts are dumped on the chute and slide to a tote box or pan. Magnus Chemical Co., Inc. For more data circle No. 42 on postcard, p. 113

#### Mesh eliminator

This wire mesh entrainment separator is knitted from Monel nickelcopper alloy wire for use in corrosive environments. Wires are repositioned by a herring-bone fold



to expose greater area for impingement, the maker states. The mesh is said to be more economical in drying gaseous streams and more efficient in preventing valuable or troublesome products from going up the stack. After herring-boning, the wires of the mesh touch only on the top of the crimps in each ply. The amount of wire surface which is free and usable for impingement is increased, since fewer wires are blocked out of service by being compressed against other wires. Since the small diameter wire must preserve its section in corrosive atmospheres, the choice of material is highly important. Eliminators made from Monel wire have been found extremely durable in caustic soda evaporators and when exposed to hydrogen sulfide in gases below 500°F. The International Nickel Co., Inc.

For more data circle No. 43 on postcard, p. 113

#### Micro-inch finisher

A ceramic cutting tool is designed to rapidly produce micro-finishes on all types of tungsten carbide and new ceramic cutting tools. The unit is equipped with two removable rotating Meehanite laps of 6 in. diam. These are charged with diamond compound. Tools are held on either of the two tilting tables and recipro-



cated slowly across the face of the lap. In a short time a rough-ground tool can be brought to a perfect edge finished to ½ to 6 microinches. DiMet Corp.

For more data circle No. 44 on postcard, p. 113

#### **NEW EQUIPMENT**

#### **Drill** bushings

Complete line of template drill bushings are round, one-piece hardened steel units-not assemblies. They are designed for quick, easy installation in drill templates made from thin gage aluminum or cold rolled steel-template metal 1/3 the thickness usually required. Only a single hole is required for each



bushing. This is the "on-center" hole through which the drill will pass. Self-clinching, the bushings are compression mounted by any pneumatic or oil-hydraulic squeezer or arbor press and positively locked into position. Made for drill sizes from 0.052 in. to 0.500 in. Penn Eng. & Mfg. Co.

For more data circle No. 45 on postcard, p. 113

#### **Boring bars**

Development of new standard type shank boring bars incorporating two square tool bit holes in each bar has been announced. Use of a device of incorporating both 90° and 30° tool bit holes in the same boring bar is described as permitting increased versatility. Rough and finished spot facing, back spot facing, bottom boring, through boring, counter boring and back counter boring operations may be performed, the maker states, with 50 to 75 pct less boring bar inventory. Bars are available with No. 4 and No. 5 Morse taper shanks for use on radial drills, tail stocks of lathes, turret lathes, boring mills and jig borers as well as horizontal and vertical milling machines. Use of reducing sleeves allows their adaption to machines with spindles other than No. 4 and 5 Morse taper. Bars, designed to use any standard tool bit, have a hardened and ground surface on the tool bit end for accurate setting and long life. Beaver Tool and Eng. Corp.

For more data circle No. 46 on postcard, p. 113

# Hendrick Adds Class to Living Rooms and Locker Rooms →

More and more designers are including Hendrick Perforated Metal in the fabrication of new products. Typical of these is one company who manufactures the attractive room divider shown above



using Hendrick Perforated Metal Square Link design. Another manufacturer installs an attractive Hendrick Ornamental Metal Grille on linen closet and locker doors.

And there are thousands of other applications where Hendrick Perforated Metal has added to product style and functionalism. For information on the type of perforated metal or grille best suited to your needs, call Hendrick today.





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NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture.



#### Pressure gage courtesy J. E. Lonergan Co., Philadelphia 6, Pa.

# Beryllium Copper Tubing by Superior

This unusual term describes perfectly one of the most important properties of beryllium copper tubing. The Bourdon tube shown above is an excellent example. Once the beryllium copper tube is in the gage, it "remembers" its job and acquires no new habits. It yields constantly to pressure and as constantly returns to its original position without taking a new "set."

Beryllium copper tubing by Superior has this and many other important characteristics to a marked degree, such as hardenability, corrosion and fatigue resistance, thermal and electrical conductivity. It is easy to fabricate, it is nonmagnetic.

Beryllium copper tubing lends itself to a wide variety of applications. It can be severely worked to form convoluted flexible waveguides and bellows. Cold drawn to specifications, followed by proper hardening, it makes an excellent aircraft antenna, with the strength to withstand thousands of hours' vibrating in 100 mph winds. Used as a contact roll in a business machine collator, it is wear and corrosion-resistant, and a good electrical conductor. Or, as above, shaped for use as a Bourdon tube, it is tough, ductile, durable—and holds its original shape.

Superior produces tubing in over 63 analyses...in stainless, alloy and carbon steels, nickel and nickel alloys, beryllium copper, titanium and zirconium. Let Superior's tubemanship and experience help you solve your tubing problems. You'll like the service and the products—they are habit-forming. Send for your free copy of Data Memorandum No. 7 on beryllium copper tubing. Write Superior Tube Company, 2004 Germantown Ave., Norristown, Pa.

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All analyses .010 in. to % in. OD-certain analyses in light walls up to 21/2 in. OD

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## The Iron Age SUMMARY . . .

It's a race against time to build steel inventories . . . And some consumers are barely able to stay even . . . Market still strong despite cutbacks in automotive . . . Export active.

A Losing Race . . . Steel consumers are racing against time in their efforts to build inventories as a hedge against higher prices and a possible steel strike. For some, it's like walking on a treadmill—it's tough to barely keep even.

The first real clue on inventories comes from the South, where a transportation strike shut down the Tennessee Coal & Iron Div. of U. S. Steel Corp., beginning April 26. Early this week —not quite three weeks later—some fabricators in the area had been forced to cut back operations and workers were being laid off.

Despite all the talk of an inventory buildup, many steel consumers would be in bad shape—quickly—in event of a general steel walkout. Steel inventories in relation to incoming orders for manufactured items would be down to rock bottom in less than 15 days in some plants.

With interest centered on Detroit automotive cutbacks, some observers are overlooking other facets of the economy. There's no doubt that Detroit is taking a lethargic attitude—for the moment—in steel. But there's no doubt also that steel business is strong.

Behind Market Demand . . . Strength of the market is due partly to price and strike hedging. But

most steel producers are looking for a good third quarter—strike or no strike, and it's doubtful that the quarter will average any less than 90 pct. The continued boom in construction, freight car building, oil and gas, and capital goods spending constitute a strong backstop to the letdown in automotive.

European consumers also are in position to take up some of the slack. Overseas customers have been shortchanged since last year and a tremendous backlog has been building up.

Order books of most steel producers continue to reflect general market strength. One large mill reports unfilled orders as of May 3 amounted to 57,000 tons more than at start of the year. Its orders have stabilized at a high level during the last three months.

Detroit Glum . . . Meanwhile, the situation in Detroit gives no sign of improvement. Scarcely any automotive orders for steel have yet been placed for July delivery. There is some talk of automakers pushing June tonnages back into July, but the expected price increase has discouraged this. Sheet and strip business has been hardest hit, but carbon bars and manufacturer's wire also seem to be slipping in Detroit.

#### Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week 2,375	Last Week 2,363	Month Ago 2,462	Year Ago 2,340
Ingot Index				
(1947-1949=100)	147.8	147.1	153.3	145.E
<b>Operating Rates</b>				
Chicago	98.5	100.0	100.5	99.5
Pittsburgh	100.0	101.0	104.0	99.0
Philadelphia	101.0	105.0	106.0	98.0
Valley	99.0	98.0*	98.0	98.0
West	101.0	105.0	103.0	100.0
Detroit	98.0	95.0*	100.0	92.0
Buffalo	105.0	105.0	105.0	105.0
Cleveland	104.0	102.0*	102.0	103.0
Birmingham	23.5	23.5	93.0	93.5
S. Ohio River	94.0	91.0	94.0	93.0
Wheeling	105.0	99.0*	102.0	102.0
St. Louis	94.0	97.0	95.0	106.0
Northeast	87.0	73.0*	93.0	98.0
Aggregate	96.5	96.0	100.0	97.0
*Revised				

#### Prices At A Glance

(cents per 1b unless otherwis	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.179	5.179	5.179	4.797
Pig Iron (Gross Ton)	\$60.29	\$60.29	\$60.29	\$56.59
Scrap, No. 1 hvy				
(gross ton)	\$50.33	\$53.17	\$55.50	\$34.67
Nonferrous				
Aluminum ingot	25.90	25.90	25.90	23.20
Copper, electrolytic	46.00	46.00	46.00	36.00
Lead, St. Louis	15.80	15.80	15.80	14.80
Magnesium	34.50	34.50	34.50	29.25
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	97.125	97.875	99.50	91.50
Zinc, E. St. Louis	13.50	13.50	13.50	12.00

## Steel Extras Move Up Again

U. S. Steel announces hike of about one pct on chemical, width and gauge extras . . . Alloy tubing, sheet, plate and strip affected . . . C.F.&I. raises base.

◆ UPWARD PRICE revisions of certain chemical content extras for carbon special quality bars, carbon rods, wire, semi-finished products, and alloy steels were announced by U. S. Steel Corp. and its general operating divisions; American Steel & Wire, Columbia-Geneva Steel and Tennessee Coal & Iron.

Width and gauge extras for alloy plate and alloy sheet and strip also were revised upward in "amounts similar to recent revisions in carbon plate and strip." Included in the upward revisions was the electric furnace steel extra for alloy bars, rods, wire, and semi-finished products.

How the extra price increases will affect final prices is indicated in these grade extra increase examples: Bars, AISI 1330, \$1 per ton for basic openhearth, \$11 per ton electric furnace; slabs, AISI 1330, \$1 per ton basic openhearth, \$11 per ton electric furnace; plates, ASTM No. A8-54, \$12 per ton; sheets and strip, AISI 1330, \$1 per ton openhearth, \$1 per ton electric furnace.

National Tube Div. announced comparable adjustments in its prices covering alloy tubing. The revised prices reflect current increased costs of manufacturing. The new prices were effective as of 12.01 a.m., May 11.

Overall effect amounted to about one pct increase on affected products.

Although a general price increase in steel is not expected until after U. S. Steel's labor contract negotiations are concluded (probably in June), Colorado Fuel & Iron Corp. announced a base price increase of 55¢ per cwt on carbon plate produced at Claymont, Del. The hike from \$4.80 to \$5.35 per cwt reflects a per-ton increase of \$11. C.F.&I.

also increased base price of abrasive resistance plates \$11 a ton to \$6.20 per cwt at Claymont.

SHEET AND STRIP . . . In Pittsburgh, one producer says carbon sheets are booked solidly through June; and that July orders are coming in at a desirable rate. Galvanized products are a little easier. High strength sheet is moving well with gains in truck trailer and construction equipment markets offsetting losses in automotive and gas containers. There is no question but that the mills could use a few more orders for flat rolled products, but producers are expected to be operating at-or near -summer capacity. In Chicago, cold rolled demand is easing with carryover actually being reduced, but hot rolled quotas for the third quarter are being reduced by some mills. Demand for hot rolled is described as heavy. Since plate and hot rolled sheet compete for the same mill rolling space in some instances, there seems to be little hope of help in this direction. Inventories of this grade are far lower than the consumer inventories of cold rolled sheet. Both have carryovers of 30 days and some are higher. There have been scattered instances of appliance makers cutting back production in the Chicago area and this should ease more cold rolled sheet and consequently some hot rolled sheet.

BARS . . . A Pittsburgh producer of carbon bars reports a full order book through June and no indication of heavy cancellations or deferments.

#### **Purchasing Agent's Checklist**

SPECIAL				
cago's	markets			p. 51
COPPER:	Inside	report	on	Chilean
situatio	n			. p. 55

Falloffs in implement and automotive orders have been balanced by strong demand from forging, fastener, construction, and roadbuilding users. In Chicago, alloy bar with any nickel content is in desperate shortage. Stainless bar is tight but local distributors are getting by. Most distributors are pressing for third quarter increases in mill allotments of carbon bar, but so far haven't got them. Cold finished bar buying has declined slightly but backlogs of up to 60 days reported.

PLATE & STRUCTURALS . . . The Pittsburgh market is as tight as ever. One producer of high strength plate said the only inventory accumulations were those where construction was curtailed because key steel members could not be supplied. Another producer is pondering the need for new plate rolling capacity. In Chicago, fresh influx of demand since beginning of May for quarter-inch plate reported. Wide plate is toughest to come by, but plate generally is described as the most difficult material to obtain.

STAINLESS . . . Demand in Detroit depends on quality. One mill says it is sold out through August on nickel-chrome variety in sheet but business in other types not so favorable.

WAREHOUSES . . . In Chicago, a slight volume dropoff for the beginning of this month but not enough to allow inventory building. Inventories of everything except cold rolled sheet are still sinking. Cutbacks in third quarter allotments of structural and plate now definite and bars showing no increase in allotment, despite reports that bars are softening. Bars over four inches in diameter extremely scarce. Diameters below four inches in carbon bar have eased slightly, but not enough to allow inventory buildup. West Coast warehousemen say their customers seem to be surviving nicely even though customers can't get all the steel they need. Pressure from mill buyers is mounting.

TUBING . . . In Chicago, the hunt still is on for conversion rounds for seamless tube, with no success. Stainless tube is available in practice on military or AEC rated orders only.

TIN PLATE... Despite reports of slowdown in orders, Chicago buyers are pushing hard for additional tinplate in third quarter. They took heavy deliveries early this year, but their increased stocks don't seem to have curbed demand.

#### Ferro alloy prices will appear again, as usual, in next issue, May 24, 1956.

#### Comparison of Prices

(Effective May 15, 1956)

of major producing areas: Pi	ittsburgh,	Chicago,	Gary, Cl	eveland,
Price advances over previous declines appear in Italics.	week are	printed	in Heavy	Type;
accines appear in Italics.	May 15 1956	May 8 1956	Apr. 17 1956	May 17 1955
Flat-Rolled Steel: (per pound)		1500	1000	2000
Hot-rolled sheets	4.325€	4.825¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.28	6.28	6.28	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	41.50
Tin and Ternevlate: (per base box	(c)			
Tinplate (1.50 lb.) cokes	\$9.85	\$9.45°	89.45*	\$9.05
Tinplate, electro (0.50 lb.)	8.55	8.15*	8.15*	7.75
Special conted mfg. ternes		8.70*	8.70*	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65d	4.30€
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Scructural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38,25	38.25	35.50
Wrought iron bars		11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.60€	6.60¢	6.60€	5.75∉
Rails: (per 100 lb.)				
Heavy rails		84.725	\$4.725	\$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	\$68.50	\$68.50	\$68.50	\$64.00
Slabs, rerolling	. 68.50	68.50	68.50	64.00
Forging billets	. 84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	. 96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per poun-				
Wire rods		5.025€		4.675
Skelp	. 4.225	4.225	4.225	3.90
Finished Steel Composite: (per				
Base price	. 5.179€	5.179∉	5.179€	4.797

Steel prices on this page are the average of various f.o.b. quotations

	May 15 1956	May 8 1956	Apr. 17 1956	May 17 1955
Pig Iron: (per gross ton)	2000			
Foundry del'd Phila	\$65.26	\$65.26	\$65.26	\$61.19
Foundry Valley	60.50	60.50	60.50	56.50
Foundry, Southern Cin'ti		62.98	62.93	60.43
Foundry, Birmingham		55.00	55.00	52.88
Foundry, Chicago		60.50	60.50	56.50
Basic del'd Philadelphia		64.48	64.48	60.27
Basic, Valley furnace		60.00	60.00	56.00
Malleable, Chicago		60.50	60.50	56.50
		60.50	60.50	56.50
Malleable, Valley		9.50€	9.50€	9.50
74.76 pct Mn base.				
Pig Iron Composite: (per gross	ton)	*** ***	800 00	\$56.59
Pig iron	\$60.29	\$60.29	\$60.29	900.00
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	848.50	\$51.50	\$56.50	\$34.50
No. 1 steel, Phila, area	53.50	55.50	55.50	36.00
No. 1 steel, Chicago	48.50	52.50	54.50	32.50
No. 1 bundles, Detroit		49.50	53.50	27.50
Low phos., Youngstown	56.50	59.50	61.50	35,50
No. 1 mach'y cast, Pittsburgh.	56.50	57.50	58.50	43.50
No. 1 mach'y cast, Philadel'a.		55.50	55.50	44.50
No. 1 mach'y cast, Philadel a.		54.50	57.50	46.00
Steel Scrap Composite: (per gro	oss ton)			
No. 1 heavy melting scrap	\$50.33	\$53.17	\$55.50	\$34.67
Coke, Connellsville: (per net to	n at oven	)		
. Furnace coke, prompt		\$14.50	\$14.25	\$13.25
Foundry coke, prompt		17.50	17.50	16.28
Nonferrous Metals: (cents per p	ound to b	rge buve	rs)	
Copper, electrolytic, Conn	. \$46.00	846.00	\$46.00	\$36.00
Copper, Lake, Conn		46.00	46.00	36.00
Tin. Straits, New York		97.875	99.50	91.50
Zinc, East St. Louis		18.50	13.50	12.00
Lead. St. Louis	. 15.80	15.80	15.80	14.80
Aluminum, virgin ingot		25.90	25.90	23.20
Nickel, electrolytic		64.50	64.50	67.6
Magnesium, ingot		84.50	34.50	29.2
Astimore Tanada Tar	. 33.00	33.00	88.00	28.5
Antimony, Laredo, Tex	. 00.00	00.00	00.00	40.01

† Tentative. 2 Average. \*Revised.

Finished Steel Composite

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite

Based on averages for basic iron at Vallcy furnaces and foundry iron at Chicago, Phila-delphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Average of No. 1 heavy melting steel scrap
delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.e.b., subject to switching charges.

#### STAINLESS STEEL

Base price cents per lb. f.e.b. mill.

430 15.25 19.75 26.68 31.00 32.25 36.75

36.75

←To identify producers, see Key on P. 156→

Producing Point	Basic	Fdry	Mall.	Bess.	Low Phos.
Bethlehem B3	62.00	62.50	63.00	63.50	
Birdsboro, Pa. B6	62.00	62.50	63.90	63.50	
Birmingham R3 .	54.50	55.00°			
Birmingham W9.	54.50	55.00°	59.00		
Birmingham U4.	54.50	55.00°	59.00		
Buffalo R3	50.00	60.50	61.00	61.50	
Buffalo HI	60.00	60.50	61.00		
Buffalo W6	60.00	60.50	61.00	61.50	
Chester C17	62.00	62.50	63.00		
Chicago I4	60.00	60.50	60.50	61.00	
Cleveland A5	60.00	60.50	60.50	61.00	65.00
Cleveland R3	60.00	60.50	60.50	61.00	French
Duluth 14	60.00	60.50	60.50	61.00	65.00
Erie 14	60.00	60.50	60.50	61.00	65.00
Everett M6		62.50	63.00		
Fontana KI	67.50	68.00			
Geneva, Utah C7	60.00	60.50			
Granite City G2	61.90	62.40	62.90		
Hubbard Y1			60.50		
Lone Star L3		55.00			
Midland C//	60.00				
Minnequa C6	62.00	62.50	63.00		
Monessen P6	60.00				
Neville Is. P4	60.00	60.50	60.50	61.00	65.00
N. Tenawanda TI		60.50	61.00	61.50	
Pittsburgh U1	60.00		60.50	61.00	
Sharpsville 53		60.50	60.50	61.00	
So. Chicago R3				122122	
Steelton B3		62.50	63.00	63.50	68.00
Swedeland A2		62.50	63.00	63.50	
Toledo /4		60.50	60.50	61.00	122122
Troy, N. Y. R3.		62.50	63.00	63.50	68.00
Youngstown Y1.			60.50	61.00	

Product	301	382	363	304	316	321	348	410	416
Ingets, rerelling	17.75	19.00	-	20.25	31.50	25.00	33.75	15.00	-
Slabs, billets, rerelling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	-
Forg. discs, die blocks, rings	-	-	-	-	-	-	-	-	-
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.8
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.08	30.50	31.0
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.2
Sheets	44.25	44.50	52.25	47.25	68.25	54.25	73.50	36.25	-
Strip, het-relled	32.00	34.50	-	37.25	58.25	44.25	50.75	-	-
Strip, cold-rolled	41.00	44.50	_	47.25	68.25	54.25	73.58	36.25	-

DIFFERENTIALS: Add, 50c per ton for each 0.25 pct silicon or pertion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50c per ton for each 0.50 pct manganese or portion thereof over 1 pct, 32 per ton for 0.5 to 0.75 pct nickel, \$1 for each additional, 0.25 pct nickel, \$4 for each additional, 0.25 pct nickel, 587.50. Add \$1.00 for 0.31-0.09 pct phos. 1 intermediate low phos. Silvery Iron Buffalo, III, \$88.75; Jackson, II, GI, \$67.50. Add \$1.25 per (on for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75c for each 0.50 pct snanganese over 1.0 pct. Bessemer ferresilicon prices are \$1 over comparable silvery iron.

#### STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., Cl1; Brackenridge, Pa., A3; Butler, Pa., A7; McKeesport, Pa., U1; Washington, Pa., W2, (2.25e lower on Type 430) J2; Baltimore, E1; Middletown, O., A7; Massillon, O., R3; Gary, U1; Bridgeville, Pa., U2; New Castle, Ind., J2; Ft. Wayne, J4; Philadelphia, D3.

Strip: Midland, Pa., CII; Cleveland, A5; Carnegie, Pa., S9; McKeesport, Pa., FI; Reading, Pa., C2; Washington, Pa., W2; W. Leechburg, Pa., A3; Bridgeville, Pa., U2; Detroit, M2; Canton-Massillon, O., R3; Middletown, O., A7; Harrison, N. J., D3; Youngstown, C5; Sharon, Pa., SI; Butler, Pa., A7; Wallingford, Conn., U3 (.25e per lb higher); WI (.25e per lb higher); New Bedford, Mass., R6.

Bar: Baltimore, A7; Duquesne, Pa., U1; Munhall, Pa., U1; Reading, Pa., C2; Titusville, Pa., U2; Washington, Pa., J2; McKeesport, Pa., U1, F1; Bridgeville, Pa., U2; Dunkirk, N. Y., A3; Massillon, O., R3; Chicago, U1; Syracuse, N. Y., C11; Watervliet, N. Y., A3; Waukegan, A5; Canton, O., T5; Ft. Wayne, I4; Philadelphia, D5; Detroit, R5.

Wire: Waukegan, A5; Massillon, O., R3; McKeesport, Pa., F1; Ft. Wayne, J4; Harrison, N. J., D3; Baltimore, A7; Dunkirk, A3; Monessen, P1; Svracuse, C11; Bridgeville, U2.

Structurals: Baltimore, A7; Massillon, O., R3; Chicago, Ill., J4; Watervliet, N. Y., A3; Syracuse, C11.

Plates: Brackenridge, Pa., 43; Chicago, UI; Munhall, Pa., UI; Midland, Pa., CII; New Castle, Ind., I2; Middletown, 47; Washington, Pa., J2; Cieveland, Massillon, R3; Coatesville, Pa., CI5; Philadelphia, D5.

Forged discs, die blocks, rings: Pittsburgh, C11; Syracuse, C11; Ferndale, Mich., A3; Washington, Pa., J2.

Forgings billets: Midland, Pa., CII; Baltimore, AI; Washington, Pa., J2; McKeesport, FI; Massillon, Canton, O., R3; Watervliet, A3; Pittsburgh, Chicago, UI; Syracuse, CII; Detroit, R5.

## **Price Drop Continues**

Weak trend may last several more weeks with big buyers inactive and mills holding out for lower prices ... Pending steel labor negotiations a factor.

◆ PRICES IN MAJOR consuming areas dropped \$1 to \$3 for steel-making grades, repeating last week's performance and continuing a slide in the face of labor contract negotiations and mill resistance to record high prices.

Greasing the skids was the widespread phobia that approaching Big Steel contract negotiations with the United Steelworkers of America would bog down, posing possibility of a strike.

Some sources believe also that the mills are holding back on scrap purchases, hoping that prices will fall to a more reasonable level. The dull market this week was reflected by lack of activity by big buyers in the northern centers.

Most export points, with the exception of New York and Los Angeles, were inactive, adding to the sag. The South held firm, and West Coast market continued strong. The South and West Coast hadn't taken part in price advances during the past months. Consequently, they don't seem affected by the current decline.

Youngstown continued to lead as the high price area with No. 1 heavy melting and No. 1 bundles bringing \$55 to \$56. Lowest prices were reported at St. Louis, where primary grades were bringing \$40 to \$41.

Blast furnace grades are holding their own in Cleveland and New York. In Cincinnati, the outlook is improving because a major fringe consumer's oncoming labor contract negotiations are with an independent union that has a long record of peaceful negotiations.

Pittsburgh . . . Prices continue to slide here. One area mill last week bought openhearth grades at \$49 for No. 1 heavy melting, \$43 for No. 2 heavy melting and \$41 for No. 2 bundles. The purchase represented a \$2 to \$3 drop from previous mill figures and there were reports that bundles were off even more at the broker buying level. The whole market continued to suffer from a lack of heavy activity. Turnings, low phos and cast grades all are down \$2 to \$3. Brokers gloomily are talking about further slowdown in mill buying as the steel labor contracts approach the expiration date.

Chicago . . . The market continued to sink with broker buying prices falling, with mills refusing scrapoften with the thought that another two-week wait in buying will see the market sink at least another \$3 across the list. The slide in offering prices has halted somewhat, though the refusal of some mills to accept additional tonnages of scrap on prices announced last week has further weakened the market. Mill operating rates continue to hold extremely high levels. A continuing movement of scrap on older orders at higher prices has caused some reluctance on the part of dealers to move scrap at the new asking prices.

Philadelphia . . . Mills exhibited caution, staying completely off the market and causing steelmaking grades to weaken. But dealers expect action soon. Most indicate they would sell No. 1 heavy melting at \$54, off \$2 from previous level. Due to typographical error an incorrect "spread" was indicated for No. 1 bundles in last issue. Price should have read: No. 1 bundles—\$55 to \$56.

New York . . . Lack of mill buying definitely weakened steelmaking grades. Several dealers indicated they would be willing to sell No. 1 heavy melting at \$47—\$1 less than the last reported transaction. Lack of sales does not mean lack of activity. Dealers are scurrying around

gathering scrap to honor earlier orders. Export demand is holding up.

Detroit . . . Lack of buying on either the broker or mill level weakened prices of both No. 1 and No. 2 grades this week. The exception was No. 2 bundles which held firm at \$33 because of a purchase from outside the area.

Cleveland... The market fell apart last week when one local mill stopped heavy incoming shipments on both secondary and primary material. Price dropped about \$3 in Cleveland and \$2 in the valley where a sale of secondary material was made. Mill bought No. 2 steel within quoted limits at \$44 and No. 2 bundles at \$41.

Birmingham . . . Southern steel markets, not having advanced to high levels along with markets in the North, have not declined along with those in other sections. Last purchases of openhearth scrap, confined to No. 2 heavy melting, were on a basis of \$38 delivered Birmingham.

St. Louis . . . Scrap prices continued downward in the St. Louis market as in other centers. Mills have been getting more material than they need for the melt. Numbers 1 and 2 heavy melting are down \$2.50 to \$3 respectively and bundles are off \$1 to \$3.

Cincinnati . . . Prices skidded another \$2 due to generally depressed market. A local mill bought token tonnage of No. 1 steel and No. 2 bundles at lower prices. General outlook here somewhat improved because major consumer on fringe of district has independent union.

Buffalo... The overall market here is weakening because of softening prices in the valley. No. 1 heavy melting was off \$2, No. 2 heavy melting off \$1.

Boston... Because big buyers were inactive, the market here was very sluggish. Only a trickle of export activity was reported. Most grades were off \$1.

West Coast . . . Mounting export activity and operating rates of more than 100 pct of capacity have mills worried about scrap supplies. To get what they need, they're going to have to pay up to \$3 more per ton on most top grades.



# Low alloy, high strength Jalten offers good formability coupled with excellent corrosion and abrasion resistance

Jalten's high strength permits high design loads. It also permits a reduction in section when used to replace mild steels. Usually the reduction amounts to two gages affording a weight savings of approximately 25 per cent. Thus, dead weight can be eliminated—resulting in increased carrying capacity. Also, it is easily welded.

Jalten is furnished in four grades:

- No. 1—possesses high strength, good formability and fabricating qualities—good resistance to low temperature impact.
- No. 2—offers high strength, moderate formabilityimproved resistance to atmospheric corrosion.

- No. 3—gives high strength—improved resistance to abrasion.
- No. 4—provides superior formability and surface quality for bumper stock applications requiring plating.

Jalten Steels are available as sheets, strip, plates, structurals, bars and small shape sections.



#### SEND FOR THIS NEW BOOK:

Chemical properties of Jalten Mechanical properties of Jalten Jalten equivalents Jalten application data



# Jones & Laughlin



#### Pittsburgh

No. 1 hvy. melting	48.00	to	\$49.00
No. 2 hvy. melting	42.00	to	43.00
No. 1 bundles	48.00	to	49.00
No. 2 bundles	40.00	to	41.00
Machine shop turn.	34.00	to	35.00
Mixed bor. and ms. turn	34.00	to	35.00
Shoveling turnings	38.00	to	39.00
Cast fron borings	38.00	to	39.00
Low phos. punch'gs plate	58.00		59,00
Heavy turnings	48.00		49.00
No. 1 RR. hvy. melting	60.00		61.00
Scrap rails, random lgth	66.00		67.00
Rails 2 ft and under	70.00		71.00
RR. steel wheels	64.00		65.00
RR. spring steel	64.00		65.00
RR. couplers and knuckles	64.00		65.00
No. 1 machinery cast	56.00		57.00
Cupola cast	50.00		51.00
Heavy breakable cast	48.00		49.00
FIGURY DIGHERADIC CHEL	90.00	TO	97.00

#### Chicago

	48.00	to	\$50.00
No. 2 hvy. melting	38.00	to	40.00
No. 1 factory bundles	53.00	to	54.00
No. 1 dealers' bundles	49.00	to	50.00
No. 2 dealers' bundles	35.00	to	36.00
Machine shop turn	26.00	to	27.00
Mixed bor, and turn	28.00	to	29.00
Shoveling turnings	28.00		29.00
Cast iron borings	28.00		29.00
Low phos. forge crops	59.00	to	60.00
Low phos. punch'gs plate	55 00		56.00
Low phos. 3 ft and under	54.00		55.00
No. 1 RR. hvy. melting	55.00		
Scrap rails, random lgth	64.00		65.00
Rerolling rails	71.00		
Rails 2 ft and under	70.00		
Locomotive tires, cut	60.00		
Cut bolsters & side frames	60.00		
Angles and splice bars	66.00		67.00
RR. steel car axles	70.00		
RR. couplers and knuckles	59.00		
No. 1 machine cast	52.00		
Cupola cast	48.00		
Heavy breakable cast	42.00		
Cast iron break shoe	40.00		
Cast iron wheel	53.00		
Malleable	62.00		
Stove plate	42.00		
Steel car wheels	58.00		59.00
	00.00	to	03.00

#### Philadelphia Area

No. 1 hvy. melting	53.00 to 44.00 to 53.00 to 35.00 to 35.00 to 35.00 to 39.00 to 45.00 to 56.00 to 57.00 to 57.00 to 66.00 to 57.00 to 57.00 to 55.00 to 66.00 to 55.00 to 66.00 to 55.00 to 66.00 to 55.00 to 66.00 to 55.00 to 55.50 to 55.	45.00 54.00 43.00 36.00 37.00 40.00 40.00 46.00 57.00 58.00 50.00 62.00 62.00 67.00 54.00 54.00 559.50 70.00 39.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 30.00 3

#### Cleveland

No. 1 hvy. melting\$5	000		
No. 2 hvy. melting	00.00	to \$	52.00
No 1 bundles	11.00		43.00
No. 1 bundles	0.00		52.00
No. 2 bundles	35.00	to	37.00
No. 1 busheling	60.00	to	52,00
Machine shop turn	32.00	to	33.00
Mixed bor, and turn.	36.00		37.00
Shoveling turnings	36.00		37.00
	36.00		
Cut struct'r'l & plates, 2 ft	00.00	(0	37.00
Drop forme flashings	55.00		\$6.00
Drop forge flashings	50.00		52.00
	52.00		53.00
Foundry steel, 2 ft & under	54.00	to	55.00
No. 1 RR. heavy melting.	60,00	to	61.00
Rails 2 ft and under	72.00	to	73.00
Rails 18 in, and under	73.00		74.00
Railroad grate bars	41.00		42.00
	39.00		40.00
	40.00		
			41.00
Store plate	55.00		56.00
Stove plate	52.00		53.00
Malleable	60.00	to	61.00

#### Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

#### Youngstown

No. 1 hvy. melting							.\$55.00	to	\$56.00
No. 2 hvv. melting		į.					43.00	to	44.00
No. 1 bundles					۰		. 55.00	to	56.00
No. 2 bundles					0		. 40.00	to	41.00
Machine shop turn.			۰				. 32.00	to	33.00
Shoveling turnings					0	0	. 37.00	to	38.00
Cast iron borings .							. 37.00	to	38.00
Low phos. plate	0	0	0	0	0	n	56.00	to	57.00

#### Buffalo

No. 1 hvy. melting	52.00	to	\$53.00
No. 2 hvy. melting	41.00	to	42.00
No. 1 busheling	52.00	to	53.00
No. 1 bundles	52.00	to	53.00
No. 2 bundles	37.00	to	38.00
Machine shop turn,	29.00	to	30.00
Mixed bor, and turn,	30.00	to	31.00
Shoveling turnings	31.00	to	32.00
Cast iron borings	31.00	to	32.00
Low phos. plate	57.00		58,00
Scrap rails, random lgth	60.00	to	61.00
Rails 2 ft and under	70.00	to	71.00
RR. steel wheels	60.00	to	61.00
RR. spring steel	60.00		
RR. couplers and knuckles	60.00		
No. 1 machinery cast	53.00	to	54.00
No. 1 cupola cast	50.00		
aron a cupom construction			

#### Detroit

Brokers buying prices per gro	ss ton, en	cars:
No. 1 hvy. melting	46.00 to	\$47.00
No. 2 hvy. melting	36.00 to	37.00
No. 1 bundles, openhearth	46.00 to	
No. 2 bundles	32.00 to	33.00
New busheling	49.00 to	50.00
Drop forge flashings	45.50 to	46.50
Machine shop turn	24.00 to	25.00
Mixed bor, and turn	27.00 to	28,00
Shoveling turnings	27.00 to	28.00
Cast iron borings	27.00 to	28.00
Low phos. punch'gs, plate.	46.00 to	47.00
No. 1 cupola cast	46.00 to	47.00
Heavy breakable cast	39.00 to	40.00
Stove plate	40.00 to	41.00
Automotive cast	50.00 to	51.00

#### St. Louis

211 60013			
No. 1 hvy. melting	40.00	to	\$41.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 bundles	44.50	to	45.50
No. 2 bundles	33.00	to	34.00
Machine shop turn	27.00	to	28.00
Cast iron borings	29,00	to	30.00
Shoveling turnings	29.00	to	30.00
No. 1 RR. hvy. melting	57.00	to	58.00
Rails, random lengths	60.00	to	61.00
Rails 18 in. and under	67.00		
Locomotive tires uncut	57.00	to	58.00
Angles and splice bars	58.00	to	59.00
Std. steel car axles	55.00		
RR. specialties	58.00	to	59.00
Cupola cast	49.00	to	50.00
Heavy breakable cast	35.00		
Cast iron brake shoes	42.00	to	43.00
Stove plate	40.00	to	41.00
Cast iron car wheels	57.00	to	58.00
Rerolling rails	68.00	to	69.00
Malleable	50.00	to	51.00
Unstripped motor blocks	35.00	to	36.00

#### Boston

Brokers buying prices per gross			
No. 1 hvy. melting \$	12.00	to \$	43.00
No. 2 hvy, melting	33.50	to	34.50
No. 1 bundles	12.00	to	43.00
No. 2 bundles	32.50	to	33.00
No. 1 busheling	12.00	to	43.00
Elec. furnace, 3 ft & under	44.00	to	45.00
	25.00		25.50
	27.00	to	27.50
	29.00	to	29.50
	31.00	to	32.00
	45.50	to	46.00
	10.00	to	41.00
Heavy breakable cast	42.50	to	43.00
	39.00		40.00
	25.50		26.00

#### New York

Brokers buying prices per group	
No. 1 hvy. melting	46.00 to \$47.00
No. 2 hvy. melting	37.00 to 38.00
No. 2 bundles	36.00 to 37.00
Machine shop turn	25.00 to 26.00
Mixed bor, and turn,	25.00 to 26.00
Shoveling turnings	29.00 to 30.00
Clean cast chem. borings	31.00 to 32.00
No. 1 machinery cast	49.00 to 50.00
Mixed yard cast	46.00 to 47.00
Charging box cast	46.00 to 47.00
Heavy breakable cast	46.00 to 47.00
Unstripped motor blocks	33.00 to 34.00

#### Birmingham

No. 1 bvy. melting	39.00	to	\$40.00
No. 2 hvy. melting	37.00	to	38.00
No. 1 bundles	39.00	to	40.00
No. 2 bundles	31.00	to	32.00
No. 1 busheling	39.00	to	40.00
Machine shop turn	31.00	to	32.00
Shoveling turnings	32.00		23,00
Cast iron borings	21.50	to	22.50
Electric furnace bundles	44.00		45.00
Bar crops and plates	52.00	to	53,00
Structural and plate, 2 ft	51.00	to	52.00
No. 1 RR. hvy. melting	50,00		51.00
Scrap rails, random lgth	60.00		
Rails, 18 in. and under	63.00		64.00
Angles & splice bars	59.00	to	60.00
Rerolling rails	65.00		
No. 1 cupola cast	48.50		
Stove plate	47.00		
Charging box cast	32.00	to	33.00
Cast iron car wheels	39.00	to	
Unstripped motor blocks	37.00	to	38.00
Mashed tin cans	15.00	to	16.00

#### Cincinnati

Brokers buying prices per gro-		
No. 1 hvy. melting	50.00 to	\$51.00
No. 2 hvy. melting	39.00 to	40.00
No. 1 bundles	50,00 to	51.00
No. 2 bundles	37.00 to	38,00
Machine shop turn		32.00
Mixed bor. and turn.	31.50 to	32.50
Shoveling turnings	34.50 to	35.50
Cast iron borings	31.50 to	32.50
Low phos. 18 in. & under	55.00 to	56.00
Rails, random lengths	60.00 to	61.00
Rails, 18 in, and under	68.00 to	69.00
No. 1 cupola cast	47.00 to	48.00
Hvy. breakable cast	45.00 to	46.00
Drop broken cast	56.00 to	57.00

#### San Francisco

No. 1 hvy. me	lting					\$40.00	to	\$43.00
No. 2 hvy. me	lting					37.00	to	40.00
No. 1 bundles						39.00	to	42.00
No. 2 bundles						32.00	to	35.00
No. 3 bundles						26.00	to	29.00
Machine shop	turn					21.00	to	24.00
Cast iron bori	ngs					22.00	to	25.00
No. 1 RR. hvy	. mel	ti	n	g		40.00	to	43.00
No. 1 cupola								

#### Los Angeles

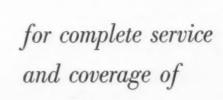
No. 1 hvy. melting	141.00 to	\$44.00
No. 2 hvy. melting	37.00 to	40.00
No. 1 bundles	40.00 to	43.00
No. 2 bundles	30.00 to	33.00
No. 3 bundles	26.00 to	29.00
Machine shop turn	18.00 to	21.00
Shoveling turnings		24.00
Cast iron borings	21.00 to	24.00
Elec. furn. 1 ft and under	41.00 to	44.00
No. 1 RR. hvy. melting	41.00 to	44.00
No. 1 cupola cast		

#### Seattle

No. 1 hvy. m	elting										\$46.00
No. 2 hvy. m	elting				0				٠		42.00
No. 2 bundle	8					0				4	33.00
No. 3 bundle	S					۰	0		0		31.00
No. 1 cupola											45.00
Mixed yard	cast.	0	0			0					45.00

#### Hamilton, Ont.

	50.50
No. 2 hvy. melting	46.50
	50.50
	42.00
	44.50
	40.50
	48.50
	44.50
	23.00
	27.50
	24.00
	58.50
Cast scrap	50.00



# STAINLESS and ALLOY STEEL SCRAP

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MODENA, PENNA. PITTSBURGH, PENNA.

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## Is 46¢ Copper Here To Stay?

Economist Eliot Janeway is convinced of it . . . Believes strikes are likely in both Chile and U. S. . . . Another economist John Haas says copper consumption is up in 1956.

◆ COPPER PRICE of 46¢ lb is here to stay. This is what economist Eliot Janeway told more than 200 executives at the 34th annual meeting of the Copper & Brass Research Assn. at Hot Springs, Va.

Economist Janeway admonished the copper and copper products producers to stop apologizing for the price of copper and worrying about how to sell present output, and to concentrate on increasing the available supply.

Basic reasoning behind Mr. Janeway's conclusions is that he considers strikes by copper workers in both Chile and the U. S. likely. This of course would aggravate the shortage and keep demand high enough to support the current price.

Another economist, John R. Haas of the economic consulting firm of Lionel D. Edie & Co., insists that despite the generally accepted trend toward substitution for copper whenever possible, copper consumption in 1956 will definitely be up over 1955. Only automotive and ammunition industries are expected to use less copper this year. These two account for about 15 pct of the copper market. The other 85 pct is expected to use more than enough additional copper to offset the minority drop.

Charles Honeywell of the Business and Defense Services Administration, sounded a call for what he

termed increased industrial statesmanship. He warned against industrialists who exert pressure on the government to further the ends of their own businesses or industries. The penalty for violating this policy could be a controlled economy and virtual extinction of the free enterprise system, he said.

William E. Haines, also of BDSA, told the members that one of the main problems facing industrial defense planners, is a method for maintaining full production after a nuclear attack. He warned that the brass industry is particularly vulnerable because such a large segment of the industry is concentrated in a single area—Naugatuck Valley, Conn. He urged a clear assessment of the brass industry's position with the aim of taking necessary precautions.

DIE CASTING . . . According to a recently completed survey by the American Die Casting Institute, the number of parts in American automobiles made by job shop die casting is on a sharp upsurge.

Job shop die casters generally agree that sales to the automotive industry in 1955 exceeded expectations.

The industry reports it shipped 117 million lb of aluminum and 327 million lb of zinc to the automotive companies. Both are new records.

Previous high for aluminum was

the 57 million lb sold to this market in 1954. Top year for zinc had been 1950 when auto companies purchased 173 million lb from the independent die casters.

The institute considers the outstanding example of what it terms the shift to die castings to be housings of torque converters in transmissions of many 1955 and 1956 models. In these cases aluminum replaced cast iron.

ALUMINUM . . . Total consumption of aluminum in the next 10 years will amount to 4 million tons, or double the huge consumption last year of 2 million tons from both primary and secondary sources, declared Kaiser Aluminum's vice president and treasurer Donald E. Browne.

Mr. Browne, addressing the Cleveland Society of Security Analysts said that he expects a continued shortage in aluminum through 1957, with a slight surplus in 1958, and shortage re-appearing in 1959.

Marketwise, the Kaiser executive was confident. He expects the electric industry for instance to double in the next 10 years, with aluminum doubling its penetration, quadrupling present consumption.

Construction is considered one of the most promising markets with up to 500,000 tons expected to go into annual schoolroom construction alone for the next 10 years.

In the mass-market auto industry, Mr. Browne said that this year's cars average 35 lbs. of aluminum per car. But by 1965 the figure should hit 95 lbs. In auto bodies aluminum is still non-competitive with steel.

Die-Cast aluminum wheels with integral brake drums are under experimentation. Here aluminum has an advantage in faster dissipation of brake drum heat resulting from higher braking pressures on a smaller 14 in. wheel. The smaller wheel would also reduce height of the car. Conversion to integral wheel and brake drums would mean 72 lbs. of aluminum per car. Mr. Browne also reviewed current experimentation between Kaiser Aluminum and Doehler-Jarvis Div. of National Lead on a diecast aluminum engine block weighing 43 lbs. replacing a 175 lb. gray iron motor block.

In the canning and container field, Mr. Browne said aluminum is still nibbling on the fringes of the specialty field but making advances through colored stock and low corrosion factors.

### **Daily Nonferrous Metal Prices**

(Cents per 1b except as noted)

	May 9	May 10	May II	May 12	May 14	May 15
Copper, electro, Conn.	46.00	46.00	46.00	46.00	46.00	46.00
Copper, Lake, delivered	46.00	46.00	46.00	46.00	46.00	46.00
Tin, Straits, New York	98.125	97.25	97.25		97.25	97.125*
Zinc, East St. Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices.

\*Tentative



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ment in the best pickling rooms for years. They're efficient, economical and easy to use.



Ferro Pickle Pills provide a quick, accurate test to augment periodic titration testing, or as a "test within a test". They assure full-capacity cleaning with fewer rejects because tank solutions can be controlled at the

required strength. You save money by eliminating costly, premature dumping of tanks.



There's a Ferro Pickle Pill for almost every pickle room need . . . a simple, sure way of determining the solution percentage of sulphuric acid, muriatic acid, alkali and metal cleaning tanks ... or the iron content of any solutions.

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#### MILL PRODUCTS

(Cents per lb, unless otherwise noted)

#### ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed) Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136-	.250- 3.
1100, 3003	42.3	40.2	39.0	38.0
	49.8	44.9	43.2	41.4
	46.9	42.7	40.9	40.8

#### Extruded Solid Shapes

Factor	6063 T-5	6062 T-6			
6-8		58.1-61.7			
12-14 24-26	43.8-45.2	59.0-63.3			
36-38	55.1-55.7	92.0-95.8			

#### Screw Machine Stock-2011-T-3

Size"	Size" 14 94-9 Price 56.0 54.1	36-36	34-1	114-114
Price	56.0	54,9	53,6	51.6

#### Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length" →	72	96	120	144			
.019 gage	\$1.310	\$1.742	\$2.175	\$2,605			
.024 gage	1.630	2.177	2.707	3,247			

#### MAGNESIUM

(f.o.b. shipping pt., carload frt. allowed) Sheet and Plate

Type→ Gage→	250- 3.00	250- 2.00	.188	.081	032
FSI Stand. Grade		65.6	66.5	75	100
FS1 Spec.		88.9	91.1	103.5	163.1
Tread Plate		67.8	68.9		
Tooling Plate	70.2		10316	122+11	

#### Extruded Shapes

factor $\rightarrow$	6-8	12-14	24-26	36-38
Comm. Grade	66 4-	67.5-	72.1-	84 9-
(FS)	69 0	69 6	72.7	85 8
Spec. Grade	81.4-	82 5-	87.1-	99.9-
(AZ31B)	84.0	84 6	87.7	100.8

#### Alloy Ingot

AZ91B	(Die Casting)		35 (delivered)
AZ63A,	AZ92A, AZ91C	(Sand Casting	) 39.25(Velasco, Tex.)

#### NICKEL, MONEL, INCONEL

(Dase prices, J.		
"A" Nickel	Monel	Inconel
Sheet, CR 102	83	99
Strip, CR 102	92	125
Rod, Bar, HR., 87	74	93
Angles, HR 87	7.4	93
Plate, HR 97	87	95
Seamless tube 122	110	153
Shot, blocks	71	* * *

#### COPPER. BRASS. BRONZE

(Freight included on 500 lbs)

	Sheet	Wire	Rod	Tube	
Copper	68.63			68.82	
Brass, 70/30	56.60	57.14		59.51	
Brass, Low	61.35	61.89	61.29	64.16	
Brass, R L	63.07	63.61	63.01	65.88	
Brass, Naval	59.80	65.06	54.11	62.96	
Muntz Metal	57.84	51.85	53.65		
Comm. Bs.	65.33	65.87	65.27	67.89	
Mang. Bs.	63.54	66.19	57.64		
Phos. Bz. 5%	86.79	84,44	87.29		
		1	1	1	

TITANIUM

(10,000 *Ib base, f.o.b. mill*)

Sheet and strip, commercially pure, \$13.10-\$13.60; alloy \$15.25-\$15.75; Plate, HR, commercially pure, \$10.50-\$11.00; alloy, \$11.50-\$12.00. Wire, rolled and/or drawn, commercially pure, \$9.50-\$11.50; alloy, \$11.50; Bar, HR or forged, commercially pure, \$7.90-\$8.15; alloy, \$7.90-\$8.10.

#### PRIMARY METAL

(Cents per 1b, unless otherwise noted) Aluminum ingot, 99+%, 10,000 lb. freight alloyed 25.90 Aluminum pig 24.00 Aluminum pig 24.00 Antimony, American, Laredo, Tex. 33.50 Beryllium copper, per lb conta'd Be \$43.00 Beryllium aluminum 5% Be, Dollars per lb contained Be 574.75 Bismuth, ton lots 3.2.65 Cadmium, del'd 51.70 Cobalt, 97-99% (per lb) \$2.60 to \$2.67 Copper, electro, Conn. Valley 46.00 Gold, U. S. Treas, per troy oz. 535.00 Indium, 99.9% dollars per troy oz. \$2.57 Iridium, dollars per troy oz. \$10 to \$120 Lead, St. Louis 15.80 Lead, New York 16.0b. Velasco, Tex. 10,000 lb. pig 33.75 Ingot 34.50 Magnesium, sticks, 100 to 500 lb. 56.00 Mercury, dollars per 76-lb flask, f.o.b. New York \$268 to \$270 Nickel colder of the flask, f.o.b. New York \$258 to \$270 Nickel solde sinter at Copper Cliff, Ont., contained nickel 60.75 Palladium, dollars per troy ox. \$37 to \$107 Silver, New York, cents per troy ox. 90.75 Tin, New York 91.125 Titanium sponge, grade A-1 \$3.25 Zinc, East St. Louis 13.50 Zinc, New York 14.00
Zinc. New York 14.00
Zirconium sponge\$10.00
*Tentative

#### REMELTED METALS

			Br	a	88		ŧ	n	g	0	r										
(Cent	8 1	er	1	b	d	0	li	ve	27	e	d		-	00	11	rl	0	a	de	(1	
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No. 12	3 .																			38	.5
80-10-10																					
No. 30	5 .					*					-					×				43	
No. 31	5 .											8	×					×		42	.0
88-10-2 i	ngo	\$																			
No. 21	0 .						ú								4.					55	.7
No. 21	5 .															*				52	.0
No. 24	5 .																			46	.7
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(cente bei to det a colore to and occi)
95-5 aluminum-silicon alloys
0.30 copper max
0.60 copper max 27.25-28.25
Piston alloys (No. 122 type)27.25-28.50
No. 12 alum. (No. 2 grade) 26.25-27.00
108 alloy
195 alloy
13 alloy (0.60 copper max.) 27.25-28.25
AXS-679

#### Steel deoxidizing aluminum, notch bar

	granul	at	H	ı	76	•	5	h	0	ŧ	
Grade	1-95-971/2	%									26.00-27.00
	2-92-95%										
Grade	3-90-92%										24.50-25.50
Grade	4-85-90%	,									24.00-24.73

#### SCRAP METALS

#### Brass Mill Scrap

					0 lb and	
						Turnings
Copper					42	41 14
Yellow	brass				31 3/4	29
Red br	ass				37	36 1/4
Comm.					381/2	3734
Mang.	bronze				28 %	281/6
Vallow					31	10

## Custom Smelters Scrap (Cents per pound carload lots, delivered

No. 1	copper		1						371/
Tarin W	coppec	24.84		- *		٠,			0.0
No. 2	copper	WII	re						36
Light	copper								33 1/2
*Refin	ery bra	188							34

#### **Ingot Makers Scrap**

(Cents per		carload refinery)		delivered
No. 1 coppe No. 2 coppe Light coppe No. 1 comp No. 1 comp Hvy. yellow Brass pipe	r wire r wire cosition turning brass	ngs solids		36 33 ½ 31 30 ½ 22 23
Radiators  Mixed old c  Mixed new  Mixed turn	ast	uminum	1	7 -18

# Dealers' Scrap (Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass	
No. I heavy copper and wire	36
No. 2 heavy copper and wire	33 3314
	31 -311/2
New type shell cuttings	29 -29 1/2
Auto radiators (unsweated)	20 -201/2
No. 1 composition	271/2-28
	26 1/2-27
	20 21
	21 -21 1/2
Clean heavy yellow brass	181/2-19
	221/2-23
New soft brass clippings	221/2-23
No. 1 brass rod turnings	20 20 1/2

#### Aluminum

Alum. pistons and struts	131/2-14
Aluminum crankcases	13 -13 1/2
1100 (2S) aluminum clippings	151/2-16
Old sheet and utensils	16 -161/4
Borings and turnings	8 8 1/2
Industrial castings	13 -131/2
2024 (24S) clippings	151/2-16
Zinc	
Now wine climpings	0 01/

# New sinc clippings $8 - 8 \frac{1}{2}$ Old zinc $5 - \frac{5}{2}$ Zinc routings $3 \frac{3}{4}$ Old die cast scrap $3 \frac{3}{4}$

Nickel and Monel	
Pure nickel clippings	\$1.75-\$2.00
Clean nickel turnings	\$1.65-\$1.85
Nickel anodes	
Nickel rod ends	
New Monel clippings	
Clean Monel turnings	65-70
Old sheet Monel	70-80
Nickel silver clippings, mixed.	
Nickel silver turnings, mixed.	21
Land	

## Miscellaneous

Block tin	84 -85
No. 1 pewter	6667
Auto babbitt	431/2-441
Mixed common babbitt	151
Solder joints	20 -201
Siphon tops	50
Small foundry type	1614-161
Monotype	151/4-16
Lino. and stereotype	141/215
Electrotype	13 -133
Hand picked type shells	101/4-11
Lino, and stereo, dross	5% 6
Electro. dross	4% - 5

	RICES		TS, BLO SLABS	OMS,	PIL- ING		SHAPES				STR	IP		
	(Effective lay 15, 1956)	Carbon Revelling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide- Flange	Het- relled	Cold- ralled	Hi Str. H.R. Low Alley	Hi Str. C.R. Low Alloy	Alloy Hot- rolled	Alloy Cold- rolled
1	Bethiehem, Pa.			\$96.00 B3		4.65 B3	6.80 B3	4.45 B3						
1	Buffalo, N. T.	\$68.50 B3	\$84.50 R3	\$96.00 R3,	5.45 B3	4.65 B3	6.80 B3	4.45 B3	4.325 R3,B3	6.25 <i>B</i> 3	6.425 B3	9.10 B3		
-	Clayment, Del.		B3	B3						6.28 107,510				
1	Harrison, N. J.													13.45 CII
1	Conshehocken, Pa.								4.375 A2	6.30 AZ	8.425 //2			-
	New Bedferd, Mass.							-		6.70 R6				
-	Johns own, Pa.	\$68.50 B3	\$84.50 B3	\$96.00 B3		4.65 B3	6.80 B3							
EAST	Boston, Mass.									6.80 78				13.80 T8
	New Haven, Conn.									6.70 DI				
	Phoenizville, Pa.					5.15 P2		5.15 P2	-	A5				
	Sparrows Pt., Md.					3.13 F2		3.10 F 4	4.325 B3	6.25 B3	6.425 B3	9.10 83		
		\$73.50 N8	\$89.59 N8			-			4.625 NS	6.70 W/			7.50 N8	
	Bridgeport, Wallingford, Conn.													
	Pawtucket, R. I. Wercester, Mass.									6.80 N7 A5				13.80 N7
	Alten, III.								4.50 LI					
	Ashland, Ky								4.325 A7			•		
	Canton-Massillen, Dever, Ohio		\$86.50 R3	\$96.00 R3										13.45 G#
	Chicago, III.	\$68.50 UI	\$84.50 R3,	\$96.00 R3,	5.45 UI	4.60 UI,	6.75 UI,	4.00 UI	4.85 AI	6.35 AI, TB			7.20 W8	13.45 78
	Cleveland, Ohio		UI,W8	UI,W8		W8	YI	-	4.325 N4, IV8	6.25 A5, J3		9.30 A5		13.45 A5
	Detroit, Mich			\$96.00 R5				-	4.425 G3,M2	6.35 DI,D2, G3 M2,PI	6.525 G3	9.20 D2, G3		
										0,20,777				
	Duluth, Minn.													
WEST	Gary, Ind Harber, Indiana	\$68.50 UI	\$84.50 UI	\$96 00 UI, YI	6.45 /3	4.60 UI, 13	6.75 U1, 13		4.325 /3. UI, YI	6.38 /3 6.25 Y/	6.425 /3. UI, YI	9.30 Y/	7.20 YI, UI	
	Sterling, III.								4.425 N4					
MIDDLE	Indianapolis, Ind									6.40 C3				
-	Newport, Ky.												7.20 N5	
	Middletewn, Ohio									6.45 A7				
	Niles, Warren, Ohio Sharen, Pa.	\$68.50 C/0	\$84.50 C/0	\$96.00 C/0					4.325 S1, R3	8.28 SI, R3,T4	8.425 SI, R3	9.10 SI, R3	7.20 51	13.45 SI
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	68.50 UI, J3	\$84.50 J3, UI,CII	\$96.90 UI, CII	5.45 UI	4.60 UI, J3	6.75 UI, J3	4.60 UI	4.325 P6	6.28 57,84			7.20 59	13.45 59
	Portsmouth, Ohio				-									
	Weirton, Wheeling, Follansbee, W. Va.					4.60 W3			4.325 W3	6.25 F3,W3	6.425 IV3	9.18 W3		
	Follanshee, W. Va. Youngstown, Ohio		\$84.50 C/O	\$96.00 YI,			6.75 Y/		4.325 UI,	6.25 YI,CS	8.425 UI,	9.30 Y/	7.20 UI, YI	13.45 C5
_	Fentana, Cal.	78.00 K/	94.09 KI	117.00 KI		5.30 KI	7.49 K1	5.45 <i>K1</i>	5.125 K/	0.90 KI	7.575 K1	-	8.95 K1	-
	Geneva, Utah	-	\$84.50 C7			4.60 C7	6.75 C7	-		-		-		
	Kansas City, Me.					4.70 S2	6.85 S2				6.878 S2		7.45 S2	
-	Les Angeles, Terrance, Cal.		\$94.80 B2	\$116.60 B		5.30 C7, B2	7.45 B2		5.875 C7. B2	8.30 C/			8.40 B2	
WEST	Minnequa, Cele.			-	-	4.90 C6			5.425 C6					
	Partland, Ore.					5.35 02								
	San Francisco, Niles, Pittsburg, Cal.		\$94.00 B2			5.25 B2, P9	7.40 B2		5.875 B2, C7					
	Seattle, Wash.		\$98.00 B2			5.35 B2	7.50 B2		5.325 B2					
-	Atlanta, Ga.								4.525 A8					
SOUTH	Fairfield, Ala. City, Birmingham, Ala.	\$68.50 72	\$84.50 72			5.10 C/6 4.60 R3,7	6.75 T2		4.325 R3,7 4.825 C/0	7	6.425 T2			
50	Houston, Lone Star,	\$74.50 L3	\$89.50 S2	\$101.00 S		4.70 S2	6.85 S2				6.675 S2		7.45 S2	

	RON AGE		fialies ide	entily produce	re listed in k	sey at end of	table. Bas	e prices, f.o.b	mill, in cen	te per lb., ur	nless otherwi	ise noted. Ex	tras apply.	
	RICES				Si	HEETS					WIRE ROD	TINPL	ATE†	BLACK PLATE
	(Bfective ay 15, 1956)	Het-relled /8 ga. & hvyr.	Celd- relied	Galvanized 10 ga.	Enameling /2 ga.	Long Terns 10 gs.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot- rolled /9 ga.		Cokes* 1.25-lb. base box	Electro* 0.25-lb. base box	Holloware Enameling 29 ga.
1	Bethiehem, Po.													
	Buffale, N. Y.	4.325 83	5.325 B3				6.375 B3	7.875 B3			5.375 W6	† Special conterne deduct 1.25-lb. coke	50¢ from	
Ì.	Claymont, Del.											price. Can-m	aking quality to 128 lb.	
	Contesville, Pa.											deduct \$2.20 coke base be	from 1.25-lb.	
	Conshohocken, Ps.	4.375 A2	5.375 A2				6.425 A2					* COKES:	.50-lb.	
-	Harrishurg, Pa.											ELECTRO: 25¢; 0.75-lb.	add 65¢;	
EAS	Hartford, Conn.											1.00-lb. add 1 ential 1.00 lb	1.00. Differ-	
	Johnstown, Pa.										5.375 B3	add 65¢.		
	Fairless, Pa.	4.375 UI	5.375 UI				6.425 UI	7.925 UI				\$9.70 UI	\$8.40 UI	
	New Haven, Coun.													
	Phoonixville, Pa.													
	Sparrows Pt., Md.	4.325 B3	5.325 B3	5.85 B3			6.375 B3	7.875 B3	8.60 B3		5.475 B3	\$9.70 B3	\$8.40 B3	
	Wercester, Mass.										5.675 A5			
	Trenten, N. J.													
	Alten, III.										5.55 <i>L1</i>			
	Ashland, Ky.	4.325 A7		5.85 A7	5.90 A7									
	Canton-Massillen, Dever, Ohio			5.85 RI, R3										
	Chicago, Joliet, III.	4.55 A1 4.325 W8					6.375 UI				5.375 N4 5.375 A5, R	3		
	Sterling, III.										5.475 N4			
	Cleveland, Ohio	4.325 J3, R3	5.325 /3, R3		5.90 R3		6.375 J3, R3	7.875 J3, R3			5.375 A5			
	Detroit, Mich.	4.425 G3, M2	5.425 G3 5.325 M2				6.475 G3	7.975 G3						
	Newport, Ky.	4.325 NS	5.325 N5	5.85 N5			-		-				-	
E WEST	Gary, Ind. Harber, Indiana	4.325 /3, UI, YI	\$.325 /3, UI, YI	5.85 UI, 13	5.90 UI. 13	6.25 UI	6.375 YI, UI,I3	7.875 UI, YI			5.375 YI	\$9.60 I3, UI, YI	\$8.30 /3, UI, YI	7.05 UI. YI
MIDDLE	Granite City, III.	4.525 G2	5.525 G2	6.05 G2	6.10 G2	-	-			-		-	\$8.40 G2	7.15 G2
Ē	Kekeme, Ind.	1.020 01		5.95 C9	6.10 03	-	-	-	-	-	5.475 C9	-	10.10.01	
	Mansfeld, Ohio	4.325 E2	5.325 E2	-	-	6.25 E2	-				-		-	
	Middletown, Obie		5.325 A7	5.85 .47	5.90 A7	6.25 A7			-		-			-
	Niles, Warren, Ohio Sharen, Pa.	4.325 S1. R3.N3	5.325 R3, N3	S.85 R3 6.85 N3	5.90 N3	6.25 N3	6.375 SI.	7.875 R3					\$8.30 R3	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 /3, UI P6	5.325 /3, UI, P6	5.65 UI	5.90 UI. A7		6.375 J3, UI	7.875 UI	8.60 UI		5.025 P6 5.375 A5	\$9.60 J3, UI	\$8.30 J3, UI	7.05 UI
	Pertamenth, Ohio	4.325 P7	\$ 325 P7		-						5.375 P7			
	Weirten, Wheeling, Feliansbee, W. Va.	4.325 W3,		5.85 W3, W5		6.25 W3 W5	6.375 W3	7 875 W3				\$9.60 W3, W5	\$8.30 W3, W5	7.05 F3 W5
	Yeungstewn, Ohio	4.325 UI. YI	5.325 Y/		5.90 Y/		6.375 UI. YI	7.875 YI			5.375 YI			
	Fentane, Cal.	5.125 K/	6.525 K1				7.175 K1	9.075 K1				\$10.35	\$9.05	\$8.15
	Goneva, Utah	4.425 C7												
	Kansas City, Me.						-				5.625 S2			
WEST	Les Angeles, Terrance, Cal.										6.175 B2			
-	Minnequa, Cala.										5.625 C6			
	San Francisca, Nile Pittsburg, Cal.	s. 5.825 C7	6.275 C7	6.60 C7							5.675 C7	\$10.35 C7	\$9.05 C7	
	Seattle, Wash.													
	Atlanta, Ga.													
SOUTH	Fairfield, Ala. Alabama City, Ala.	4.325 R3. 77	5.325 77	\$.85 R3. T2			6.375 T	'		5.625 R3	5.375 T2		\$8.40 72	
100	Heusten, Tex.										5.625 S2			

S	TEEL											
P	RICES			BAR	es				PLA	TES		WIRE
	Rfective ny 15, 1956)	Carbon Steel	Reinforc- ing	Cold Finished	Alloy Hot- rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carben Steel	Floor Plate	Alley	Hi Str. Low Alloy	Mfr s. Bright
1	Bethlebem				5.575 B3	7.425 B3	6.80 B3					
1	Buffalo, N. Y.	4.65 B3,R3	4.65 B3,R3	6.30 B5	5.575 B3, R3	7.425 B3,B5	6.80 B3	4.50 B3, R3				6.60 W6
1	Clayment, Del.							5.35 C4		4.30 C#	6.725 C4	
1	Coatesville, Pa.							4.80 L4		6.30 L4	6.725 L4	
1	Conshohocken, Pa.							4.50 A2	5.575 AZ		6.725 A2	
1	Harrisburg, Pa.							5.10 P2	5.575 C3			
1	Hartford, Conn.			6.75 R3		7.725 R3						
	Johnstown, Ps.	4.65 B3	4.65 B3		5.575 B3		6.80 B3	4.50 B3		6.30 B3	6.725 B3	6.60 B3
1	Fairless, Pa.	4.88 UI	4.80 UI		5.725 UI							
-	Newark, N. J.			6.70 W10		7.60 W10						
-	Camden, N. J.			6.70 P10								
	Bridgeport, Putnam, Conn.	4.80 N8		6.80 W10	5.725 N8			4.750 N8				
	Sparrows Pt., Md.		4.65 B3					4.50 B3		6.30 B3	6.725 B3	6.70 B3
	Palmer, Worcester, Readville, Mass. Milton, Pa.	4.80 M7	4.80 M7	6.70 W11 6.45 C14 6.70 B5		7.725 A5 B5		4.50 R3				6.90 A5 6.90 W6
1	Spring City, Pa.			6.35 K4		7.60 K4						
	Alten, III.	4.85 L1										6.775 LI
1	Ashland, Newport, Ky.							4.50 A7,N5		6.30 N5		
	Canton-Massillon, Mansfield, Ohio	4.75 R3		6.25 R2,R3	5.575 R3,T5	7.425 R2,R3, T3		4.50 El				
	Chicago, Joliet, III.	4.65 U1, N4,W8,R3, 5.15 P13	4.65 N4,R3, 5.15 P13	6.25 B5,W8, W10,A5,L2	5.575 U1,R3, W8	7.425 A5,W8, W10,L2,B5		4.50 UI, WB. 13, R3 4.725 AI	5.575 UI	6.30 UI	6.725 UI	6.60 A5,R N4,W7
	Cleveland, Ohio	4.65 R3	4.65 R3	6.25 A5,C13		7.425 A5,C13	6.80 R3	4.40 J3.R3	\$ 575 /3		6.725 R3, J3	6.60 A5. C/3
_	Detroit, Mich.	4.75 G3	4.75 G3	5.90 R5 6.45 B5 6.50 P3 6.10 P8	5.575 <i>R5</i> 5.675 <i>G3</i>	7.425 <i>R5</i> 7.425 <i>B5</i> , <i>P3</i> , <i>P8</i>	6.90 G3	4.60 G3			6.825 G3	
WEST	Duluth, Minn.											6.60 A5
MIDDLE	Gary, Ind. Harber, Crawfordaville	4.65 13, UI, YI	4.65 <i>I3, UI,</i> <i>YI</i>	6.25 M5,R3	5.575 <i>13, U1,</i> Y/	7.425 M5, R3	6.80 UI, I3, YI	4.50 /3, U1. Y1	8.575 /7	6.30 UI, YI	6.725 UI. 13, YI	6.35 M4
Ī	Granite City, III.							4.70 G3			-	6.70 C9
	Kekomo, Ind.		-									6.70 N4
	Sterling, M.	4.75 N4	4.75 N4							4 20 51	4 22 24	6,78 744
	Niles, Warren, Ohie Sharen, Pa.			6.25 C10	\$.75 C10	7.425 C10	6.80 R3	4.50 SI,R3		6.30 SI	6.725 SI	4.00.46
	Pittsburgh, Pa. Midland, Pa.	4.45 J3, UI, CII	4.65 J3, UI	6.25 A5,C8, C11,J3, W10.B4,R3	5.\$7\$ U1,C11	7.425 A5,C11 W10,C8,R3	6.80 J3, UI	4.50 J3, UI	\$.575 UI	6.30 UI	8.725 /5. 0	11 8.60 A5,,
	Pertamenth, Ohio								-			6.60 P7
	Weirton, Wheeling, Fellansbee, W. Va	4.65 W3						4.50 W3, W5				
	Yeungstewn, Ohio	4.65 UI, YI, C10, R3	4.45 UI, YI, R3	6.25 YI, UI	5.575 U1, Y1 C10	7.425 YI,CH	6.80 UI, Y	4.50 UI, YI, R3		6.30 Y/	6 725 Y1	6.60 YI
	Emeryville, Cal.	5.40 J5	5.40 J5									
	Fentana, Cal.	5.35 K1	5.35 K1		6.625 K1		7.50 KI	5.20 KI		7.00 K1	7.375 K1	
	Geneva, Utah							4.50 C7			6.725 C7	
	Kansas City, Mo.	4.90 .52	4.90 S2		5.825 S2		7.05 S2					6.85 S2
WEST	Los Angeles, Torrance, Cal.	5.35 B2,C7	5.35 B2,C7	7.70 R3	6.625 B2		7.50 B2				7.625 B2	7.55 82
-	Minneque, Colo.	5.10 C6	\$.10 C6					5.35 C6				6.85 C6
	Pertland, Ore.	5.40 02	5.40 02									
	San Francisca, Nile Pittsburg, Cal.	5 40 B2,P9					7.55 B2				8600 50	7.55 C7 7.55 C6
	Seattle, Wash.	5.40 B2,P1 N6	2, 5.40 B2.P1	2			7.55 B2	5.40 82		7.20 82	7.625 B2	
-	Atlanta, Ga.	4.85 .48	4.85 A8									6.80 Al
SOUTH		4.65 T2.R3	_				6.80 72	4.50 72,R			6.725 T2	6.60 R3
S	Houston, Ft. Wort	h, 4.90 SZ	4.90 S2		5.825 S2		7.05 SZ	4.85 L3 4 60 S2		6.40 SZ	6.825 SZ	6.85 S

#### Steel Prices (Effective May 15, 1956)

#### **Key to Steel Producers**

With Principal Offices

Al Acme Steel Co., Chicago

Alan Wood Steel Co., Conshohocken, Pa.

Allegheny Ludlum Steel Corp., Pittsburgh A3 44 American Cladmetals Co., Carnegie, Pa. A5 American Steel & Wire Div., Cleveland

A6 Angell Nail & Chaplet Co., Cleveland Armco Steel Corp., Middletown, O.

48 Atlantic Steel Co., Atlanta, Ga.

Babcock & Wilcox Tube Div., Beaver Falls, Pa. BI

Bethlehem Pacific Coast Steel Corp., San Francisco 82 B3 Bethlehem Steel Co., Bethlehem, Pa. Blair Strip Steel Co., New Castle, Pa. B4

Bliss & Laughlin, Inc., Harvey, Ill. BS Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa. 86

Cl Calstrip Steel Corp., Los Angeles Carpenter Steel Co., Reading, Pa. CZ

Central Iron & Steel Co., Harrisburg, Pa. C3 Ca Claymont Products Dept., Claymont, Del.

Cold Metal Products Co., Youngstown, O. CS C6 Colorado Fuel & Iron Corp., Denver Columbia Geneva Steel Div., San Francisco

Columbia Steel & Shafting Co., Pittaburgh CB C9 Continental Steel Corp., Kokomo, Ind.

C10 Copperweld Steel Co., Pittsburgh, Pa. C11 Crucible Steel Co. of America, Pittsburgh C12 Cumberland Steel Co., Cumberland, Md

C13 Cuyahoga Steel & Wire Co., Cleveland C14 Compressed Steel Shafting Co., Readville, Mass.

C15 G. O. Carlson, Inc., Thorndale, Pa. C16 Conners Steel Div., Birmingham

C17 Chester Blast Furnace, Inc., Chester, Pa. DI Detroit Steel Corp., Detroit

D2 Detroit Tube & Steel Div., Detroit D3 Driver Harris Co., Harrison, N. J.

D4 Dickson Weatherproof Nail Co., Evanston, Ill.

D5 Henry Disston & Sons, Inc., Philadelphia

El Eastern Stainless Steel Corp., Baltimore E? Empire Steel Co., Mansfield, O

FI Firth Sterling, Inc., McKeesport, Pa

F2 Fitzaimmona Steel Corp., Youngstown F3 Follansbee Steel Corp., Follansbee, W. Va.

GI Globe Iron Co., Jackson, O.

G7 Granite City Steel Co., Granite City, Ill.

GJ Great Lakes Steel Corp., Detroit G4 Greer Steel Co., Dover, O

HI Hanna Furnece Corp., Detroit

12 Ingersoll Steel Div., Chicago 13 Inland Steel Co., Chicago 14 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.

 Jessop Steel Corp., Washington, Pa.
 Jones & Laughlin Steel Corp., Pittsburgh J4 Joelyn Mfg. & Supply Co., Chicago

J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal. K2 Keystone Steel & Wire Co., Peoria

K3 Koppers Co., Granite City, Ill. K4 Keystone Drawn Steel Co., Spring City, Pa.

LI Laclede Steel Co., St. Louis L? La Salle Steel Co., Chicago L3 Lone Star Steel Co., Dallas

L4 Lukens Steel Co., Coatesville, Pa.

MI Mahoning Valley Steel Co., Niles, O. M2 McLouth Steel Corp., Detroit

M3 Mercer Tube & Mig. Co., Sharon, Pa. M4 Mid-States Steel & Wire Co., Crawfordsville, Ind

M5 Monarch Steel Div., Hammond, Ind. M6 Mystic Iron Works, Everett, Mass. M7 Milton Steel Products Div., Milton, Pa.

NI National Supply Co., Pittsburgh N2 National Tube Div., Pittsburgh N3 Niles Rolling Mill Div., Niles, O.

N4 Northwestern Steel & Wire Co., Sterling, Ill. N5 Newport Steel Corp., Newport, Ky. N6 Northwest Steel Rolling Mills, Seattle

N7 Newman Crosby Steel Co., Pawtucket, R. I. N8 Northeastern Steel Corp., Bridgeport, Conn.

01 Oliver Iron & Steel Co., Pittsburgh 02 Oregon Steel Mills, Portland

PI Page Steel & Wire Div., Monessen, Pa. P2 Phoenix Iron & Steel Co., Phoenixville, Pa. P3 Pilgrim Drawn Steel Div., Plymouth, Mich.

P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh P6 Pittsburgh Steel Co., Pittsburgh

P7 Portsmouth Div., Detroit Steel Corp., Detroit P8 Plymouth Steel Co., Detroit

Py Pacific States Steel Co., Niles, Cal.

P10 Precision Drawn Steel Co., Camden, N. J P11 Production Steel Strip Carp., Detroit

P12 Pacific Steel Rolling Mills, Seattle P13 Phoenix Mfg. Co., Joliet, Ill.

RI Reeves Steel & Mig. Co., Dover, O. R2 Reliance Div., Eaton Mfg. Co., Massillon, O.

R3 Republic Steel Corp., Cleveland Re Roebling Sons Co., John A., Trenton, N. J. At Rotary Electric Steel Co., Detroit

Rt Rodney Metals, Inc., New Bedford, Mass. R7 Rome Strip Steel Co., Rome, N. Y.

SI Sharon Steel Corp., Sharon, Pa. 52 Sheffield Steel Corp., Kansas City 53 Shenango Furnace Co., Pittsburgh

S4 Simonds Saw and Steel Co., Fitchburg, Mass.

 Sweet's Steel Co., Williamsport, Pa.
 Standard Forging Corp., Chicago Stanley Works, New Britain, Conn. 57 S8 Superior Drawn Steel Co., Monaca, Pa. 59 Superior Steel Corp., Carnegie, Pa. S10 Seneca Steel Service, Buffalo

TI Tonawanda Iron Div., N. Tonawanda, N. Y. 72 Tennessee Coal & Iron Div., Fairfield
73 Tennessee Products & Chem. Corp., Nashville

Thomas Strip Div., Warren, O. 75 Timken Steel & Tube Div., Cante 76 Tremont Nail Co., Wareham, Mass.

77 Texas Steel Co., Fort Worth 78 Thompson Wire Co., Boston

UI United States Steel Corp., Pittsburgh U2 Universal-Cyclops Steel Corp., Bridgeville, Pa. U3 Ulbrich Stainless Steels, Wallingford, Conn.

U4 U. S. Pipe & Foundry Co., Birmingham W1 Wallingford Steel Co., Wallingford, Conn. W2 Washington Steel Corp., Washington, Pa. W3 Weirton Steel Co., Weirton, W. Va. W4 Wheatland Tube Co., Wheatland, Pa

W5 Wheeling Steel Corp., Wheeling, W. Va. W6 Wickwire Spencer Steel Div., Buffalo W7 Wilson Steel & Wire Co., Chicago W8 Wisconsin Steel Co., S. Chicago, Ill. W9 Woodward Iron Co., Woodward, Ala

W10 Wyckoff Steel Co., Pittsburgh WII Worcester Pressed Steel Co., Worcester, Mass. W12 Wallace Barnes Steel Div., Bristol, Conn.

Y/ Youngstown Sheet & Tube Co., Youngstown, O.

#### PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about \$200 per not ton

							BUTT	WELD										SEAM	LESS			
	1/2 1	m.	%	in.	11	0.	11/4	In.	11/2	in.	2 !	la.	21/2	3 In.	2	In.	23/2	In.	31	la.	31/2-	4 In.
STANDARD T. & C.	Bik.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Bik.	Gal.	Bik.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Bik.	Gel.	Bik.	Gal.
parrows Pt. B3 eungstewn R3 oortans KI siteburgh J3 liten, III. L1 haron M3 airless N2 sirless N2 sirless N5 Wheatland W4 oungstewn Y1 ndiana Harber Y1 orain N2 orain N2	16.50 18.50 6.00 18.50 16.50 18.50 18.50 18.50 18.50 18.50 18.50	1.25 1.25 13.25 1.25 1.25 3.25 3.25 3.25 3.25 3.25 3.25 3.25	21.50	5.25 5.25 +9.25 7.25 5.25 7.25 7.25 7.25 7.25 7.25 7	24.00 24.00 22.00 24.00 24.00 24.00 24.00 24.00 24.00 23.00	8.75 8.75 +5.75 10.75 8.75 10.75 10.75 10.75 10.75 10.75 10.75	26.50 14.00 26.50 24.50 26.50 24.50 26.50 26.50 26.50 26.50 25.50	9.50 10.00 +4.00 11.50 9.50 11.50 11.50 11.50 11.50 11.50	25.00 27.00 14.50 27.00 25.00 27.00 27.00 27.00 27.00 27.00 27.00 27.00 27.00	11.00 +3.00 12.50 10.50 12.50 12.50 12.50 12.50 12.50 12.50	27.50 15.60 27.50 25.50 27.50 25.50 27.50 27.50 27.50 27.50 27.50	11.50 +2.50 13.00 11.00 13.00 11.00 13.00 13.00 13.00 13.00	29.00	10.75 12.75 10.75 12.75 12.75 12.75 12.75 11.75	4.00	+11.	10.50	+6.25 +6.25 +6.25	13.00	+3.75 +3.75 +3.75 +3.75	14.50 14.50	+2.1
ZETRA STRONG FLAIN ENDS japrows Pt. B3 coungstown R3 carleas N2 contans K1 Pittaburgh J3 klen, Bl. L1 jbaran M3 Pittaburgh N1 Wheatland W4 coungstown Y1 contans K2 contans K2 contans M3 contans M3 contans M4	21.00 23.00 21.00 10.50 23.00 23.00 23.00 23.00 23.00 23.00 23.00 23.00 23.00	7.25 7.25 7.25 7.25 7.25 9.25 9.25 9.25 9.25 9.25 9.25	27.00 25.00 14.50 27.00 25.00 27.00 27.00 27.00 27.00 27.00 27.00	11.25 11.25 13.25 11.25 13.25 13.25 13.25 13.25 13.25	29.00 27.00 16.50 29.00 27.00 29.00 29.00 29.00 29.00 29.00	14.75 14.75 16.75 16.75 16.75 16.75 16.75 16.75 16.75	29.50 27.50 17.00 29.50 27.50 29.50 29.50 29.50 29.50 29.50	14.00 13.50 15.50 13.50 15.50 15.50 15.50 15.50	30.00 28.00 17.50 30.00 28.00 30.00 30.00 30.00 30.00 29.00	15.00	30.50 28.50 18.00 30.54 28.54 30.54 30.54 30.54 30.54 29.54	15.50 15.00 17.00 15.00 17.00 17.00 17.00 17.00 17.00	31.00 29.00 18.50 31.00 29.00 31.00 31.00 31.00 31.00 31.00	14.75 13.75 15.75 13.75 15.75 15.75 15.75 15.75 15.75	5.54 5.54 5.54	+8.56 +8.56 +8.56	13.00	+2.75 +2.75 +2.75	15.54 15.54	+0.25 ) +0.25 ) +0.25 ) +0.25	20.58	4.

Throads only, buttweld and seamless 2½ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., a.g., zinc price range of over 1¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis sinc price new 13.5¢ per lb.

#### TOOL STEEL

F.o.b	. mill					
W	Cr	V	Mo	Co	per lb	SAE
18	4	1	-	_	\$1.60	T-1
18	4	1	_	6	2.305	T-4
18	4	3		_	1.765	T-2
1.5	4	1.5		-	.96	M-1
6	4	3	6	_	1.35	M-2
6	4	2	5	-	1.105	M-2
High	-carb	on ch	romiu	m	.77	D-3, D-5
OIL	harde	ned n	nanga	nese	.43	0-2
Spec	ial cs	rbon			.39	W-1
					.33	W-1
Regu	lar c	arbon			.275	W-1
W	areho	use p	rices	on al	nd east	of Mis-
						West of
Miss	issipp	L 64	higher	r.		

#### CLAD STEEL Base prices, cents per lb f.a.b.

		Plate	(A3, J2	, L4)	Sheet (12)
	Cladding	10 pct	15 pct	29 pct	20 pet
	304	30.30	33.15	36.05	32.50
1	316	35.50	38.45	41.40	47.00
Statelesse Type	321	32.00	34.85	37.75	37.25
ł	347	34.40	37.90	41.40	48.25
Sign	495	25.80	29.60	33.35	
	410, 430	25.30	29.10	32.85	

CR Strip (89) Copper, 10 pct, 2 sides, 42.75; 1 side, 33.75.

#### **ELECTRICAL SHEETS**

22-Gage	Hot-Rolled	Cold-Reduced (Coiled or Cut Length)				
F.a.b. Mill Cents Per Lb	(Cut Langths)*	Semi- Processed	Fully Processed			
Field	8,40	5.60				
Armature	9.35	9.60	10.10			
Elect	9.95	10.20	10.78			
Meter	10.95	11.20	11.70			
Dyname	11.85	12.10	12.60			
Trans. 72	12.80	13.05	13.55			
Trans. 65	13.35	Grain (	Oriented			
Trans. 58	13.85	Trans. 88.	17.4			
Trans. 52	14.85	Trans. 73 .	17.91			

Producing points: Booch Bottom (W5); Brackenridge (A5); Granite City (G2); Indiana Harber (I5); Mansfield (E2); Newport, Ky. (N5); Niles, O. (N5); Vandergrift (U1); Warren, O. (R3); Zaneaville (A7).

\*\*Coile 75¢ higher.

#### LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

											18 10
Openhearth	lump			0	0	 	٠	0	 		
Old range,											11.2
Old range,											11.1
Mesabi, be	ssemer		. 0			 				 0	11.0
Mesabi, no	nbessen	aei	-			 	٠		 	 0	10.8
High phosp											10.8

Metropolitan Price, dollars per 106 lb. WARE-HOUSES Strip Sk Plates Sh Alloy Bare \*\* Cold-Drawn 4615 As relied Het-Relled 4615 As relled Het-Rulled 4140 Americal Galvanissd (10 gage) Hat-Rellad Celd-Dra 4140 Annealed Cold-Finished Don's Ė era.....\$.10 7.31 8.32 8.37 7.65 7.63 7.93 7.61 8.62 14.38 Birmingham.....15 7.93 8.51 8.37 8.37 9.83 13.66 16.76 Besten ...... . 10 8.22 9.17 10.42 8.31 7.35 8.40 10.16 7.50 7.80 7.75 7.50 8.95 13.45 16.50 7.28 9.25 7.36 7.68 7.58 7.42 7.90 13.28 16.38 cinnati......15 7.48 7.60 7.89 7.66 8.30 13.59 13.29 16.44 16.38 7.46 7.77 7.91 7.48 8.15 13.41 13.11 16.26 16.21 7.28 8.39 9.10 8.60 8.75 8.90 9.82 17.97 8.60 10.76 11.22 8.99 Detroit. . . . . . . 15 7.47 8.58 9.53 7.49 7.88 8.05 7.70 8.19 13.78 13,40 16.55 16.50 7.80 8.26 8,25 14.35 14.66 17.15 17.05 Kansas City.... .20 7.47 9.17 7.73 13.52 16.57 8.85 8.40 8.25 11.00 Les Angeles .... . 10 8.25 11.10 8.60 14.45 18.00 10.10 7.31 7.46 Mamphis . . . . . 10 7.12 8.25 7.38 7.60 9.15 Milwaukee..... 15 7.37 8.48 9.34 7.45 7.60 7.75 7.51 8.09 13.29 16.39 New Orleans.... 15 7.20 8.35 7.45 7.48 7.78 7.50 9.55 9.73 8.33 8.31 8.21 8.26 9.87 13.57 16.67 New Tork . . . . . 10 7.88 8.98 7.65 7.45 7.95 7.65 9.50 7.25 7.44 8.54 9.51 8.09 7.82 7.85 7.83 8.62 13.35 16.45 Pittaburgh . . . . . 15 7.28 8.39 9.55 7.60 7.58 7.42 13.35 13.05 16.15 8.80 7.75 7.95 15.00 Pertland.... 10.65 8.00 7.95 17.50 8.15 9.35 9.15 Salt Lake City. . . 20 San Francisco. . . 18 8.30 9.75 10.25 8.45 8.40 8.35 8.25 11.55 14,45 18.00 10.50 10.90 8.90 8.50 8.60 12.25 14.65 13.49 St. Louis . . . . . 15 7.57 8.68 9.54 7.65 7.80 7.98 7.71 8.44 16.59 8.59-9.14 13.51 ..... 16.31 St. Paul.......25 7.72 7.45 7.74 8.51 7.94 9.89 7.94

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 3999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions. (1) 1500 to 3999 lb. (4) 1000 lb or over. (3) \$.25 delivery. (4) 1000 to 1999 lb, \$.25 delivery. Plus analysis charge.

#### MERCHANT WIRE PRODUCTS

	Standard & Ceated Nails	Weven Wire Fence 9-15½ gs.	"T" Pence Pests	Single Leep Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld	Merch. Wire Galv.
F.o.b. Mill	Col	Cel	Col	Cel	Cel	¢/lb.	¢/lb.
Alabama City R3. Aliquippa, Pa. J3. Atlanta A8. Bartenville K2* Buffale W6. Cleveland A6. Cleveland A6. Cleveland A5. Crawfordaville M6* Densera, Pa. A5. Duluth A5. Fairfield, Ala. T2. Galvasten D4. Houston S2. Johnstewn, Pa. B3* Joliet, Ill. A5. Kokomo, Ind. C9. Les Angeless B2* Kannaa City S2. Minnequa C6. Moline, Ill. R3. Pittsburg, Cal. C7. Pertamouth P7. Rankin, Pa. A5. S. Chicage R3. S. San Francisco C6.	152 154 154 152 157 157 152 152 152 153 157 157 157 157 157	162 167 168 168 162 162 162 162 170 164 162 163 164 167 167 167 167	162	177 175 175 177 175 175 175 175 177 178 178	180 181 179 181 175 175 175 177 180 175 177 180 180 180 180 180 180 180 180 180 180	7.40 7.60 7.50 7.50 7.50 7.50 7.50 7.50 7.50 7.5	7.80 7.89 8.128 8.20 7.90 8.10 8.00 8.05 7.80 8.05 8.05 7.80 8.05 8.05 8.05 7.80

Galvanized products computed with zinc at 5¢ par lb. Exceptions: \*zinc at 12.5¢ per lb; \*\*13¢ zinc.

#### C-R SPRING STEEL

		CARB	ON CO	NTEN	Т
Cents Per Lb F.o.b. Mill				0.81- 1.05	1.06-
Bristel, Conn. W12 Buffalo, N. Y. R7 Carnegie, Pa. S9	7.00	8.95	18.90 18.50 10.60	13.05 12.65 12.75	15.75 15.35 15.35
Cleveland A5 Detroit D1	7.10	9.05	10.60	12.75 12.85	15.45
Detroit D2 Harrison, N. J. CII					15.75
Indianapolis C5 New Castle, Pa. B4 New Haven, Conn. D1	7.08	8.95	10.50 10.50	12.65 12.65 13.05	15.35
Pawtucket, R. I. N7 Pittsburgh S7	7.65	9.35	10.90	13.05	
Riverdale, III. Al Sharen, Pa. Sl	7.26	9.05	10.60	12.75	
Trenten R4	7.5	9.35	10.90	13.05	15.7
Warren, Ohio T4 Weirten, W. Va. W3	. 7.10	8.95	10.50 10.50	12.65	
Worcester, Mass. A5. Youngstown C5			10.50	13.05	

#### BOILER TUBES

S per 100 ft, carload	Si	30	Seam	niess	Elec. Weld		
fets, cut 10 to 24 ft. F.o.b. Mill	OD- In.	B.W. Ga.	H.R.	C.D.	H.R.	C.D	
Babceck & Wilcox	2 21/2 3 31/4 4	13 12 12 11 11	43.22 49.90 58.26	50.31 58.10 67.83	29.93 40.31 46.55 54.34 72.17		
National Tube	2 21/2 3 31/2 4	12 12 11	43.22 49.90 58.26	50.31 58.10 67.83	29.93 40.31 46.55 54.34 72.17		
Pittsburgh Steel	2 21/2 3 31/2 4	13 12 12 11 10	43.22 49.90 58.26	50.31 58.10 67.83			

#### RAILS, TRACK SUPPLIES

F.a.b. Mill Cents Per Lb	Ne. 1 Std. Raile	Light Rails	Jeint Bare	Track Spikes	Screw Spikes	Tie Plates	Track Belts Universed
Bessemer UI .	4.725	5, 65	5, 825				
So. Chicago R3.				8.05			
Engley T2	4.725	5.65					
Fairfield T2		5.65		8.05		5.625	
Gary UI	4.725	5.65				5.625	
Ind. Harbor 13	4.725		5.825	7.90		5.625	
Ind Harber YI				8.05			
Johnstown B3, Johnst U/		5.65					
Johnt Ul			5.825				
Kansas City SZ. Lackawanna Bi				7.90			
Lackawanna B3	4.725	5.65	5.825			5.625	
Lebanen B3							12.15
Minneque Co	4.725	6.15	5.825	7.90		5.625	12.15
Pittsburgh 01					11.90		12.15
Pittsburgh P5.							12.15
Pittsburgh /3.				8.85			
Seattle B2				8.49		5.775	12.61
Seattle B2 Steelten B3	4.725		5.825			5.625	
Struthers Y/				8.05			
Terrance C7			1			5.775	
Williamsport S!		5.63					
Toungstown R3				8.05			

COKE
Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa
Foundry, beehive (f.o.b. oven)
Connellsville, Pa \$17.00 to \$18.00
Foundry, oven coke
Buffalo, del'd\$28.75
Chicago, f.o.b 27.00
Detroit, f.o.b 27.50
New England, del'd 28.5!
Seaboard, N. J., f.o.b 26.71
Philadelphia, f.o.b 26.50
Swedeland, Pa., f.o.b 26.50
Painesville, Ohio, f.o.b 27.5
Erie, Pa., f.o.b 27.5
Cleveland, del'd 29.4
Cincinnati, del'd
St. Paul, f.o.b
St. Louis, f.o.b 28.5
Birmingham, f.o.b
Lone Stee Tor fob

#### ELECTRODES

Cents per lb f.o.b. plant, threaded, with nipples, unboxed.

G	RAPHITE		CARBON*						
Diam. (în.)	Length (in )	Price	Diam. (In.)	Length (in.)	Price				
24 28 16 to 18 14 12 10	84 72 72 72 72 72 78	23.00 22.25 22.50 23.00 23.50 24.25	40 35 30 24 20 17	100, 110 110 110 72 to 84 90 72	9,90 9,90 10,05 10,30 10,10				
5 9 3 21/4 2	60 60 49 40 30 24	24.50 27.25 30.25 32.00 33.75 52.50	14 12 10 8	72 60 60 60	10.85 11.75 11.86 12.10				

<sup>\*</sup> Prices shown cover carbon nipples.

#### ELECTROPLATING SUPPLIES

Anodes	
(Cents per lb, frt allowed in quant	ity)
Cast elliptical, 18 in. or longer, 5000 lb lots	61.92 57.75
Brass, 80-20, ball anodes, 2000 lb or more	60.00
Zinc, ball anodes, 2000 lb lots (for elliptical add 2e per lb)	21.75
Nickel, 99 pct plus, rolled carbon (rolled depolarized add 3¢ per lb	
Cadmium	\$1.70
Chemicals	
(Cents per lb, f.o.b. shipping poin	(1)

Copper cyanide, 100 lb drum	83.50
Copper sulphate, 5 or more 100 lb	
bags, per cwt	
Nickel salts, single, 4-100 lb bags	33.25
Nickel chloride, freight allowed,	
300 lbs	43.50
Sodium cyanide, domestic, fob N. Y.	
1 to 4 200 lb drums	22.35
(Philadelphia price 22.60)	
Zinc cyanide, 100 to 900 lb	55.55
Potassium cyanide, 100 lb drum	
N. Y	48.00
Chromic acid, fiake type, 1 to 20	
100 lb drums	30.25

#### BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

#### Machine and Carriage Bolt

	iscour	
Fu	ill Fu	ll case
Quan	tity o	r more
½ in. & smaller x 6 in. & shorter Larger than ¼ in. diam. and	61	63
all diam. longer than 6 in. Rolled thread carriage bolts	55	57
½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. &	61	63
Lag, all diam. longer than 6 in	55 61	63
Nuts, Hex, HP, req. & hvy.		
%" or smaller %" to 1%" inclusive 14" to 1%" inclusive 1%" and larger	64 63 65	66 65 67
C.P. Hex regular & hvy.		
%" or smaller	64	66

# %" and smaller ...... 66 %" and larger ...... 63 Add 25% for less than case or keg quantity.

Hot Galv. Nuts (all types) 1%" or smaller ..... 44 47 Finished, Semi-finished, Hex Nuts

	Base per	100 16
1/4 in. and larger		\$9.95
	Pet O	ff List
7/16 in and smaller		33

#### Cap Screws

Rivets

anh aciens			
		ount H.C. Hee	2.5
Bright Treat			
New std. hex head, pack- aged			
%" thru %" diam. x 6"			
and shorter	34	30	
smaller and shorter .	31	16	
shorter New std. hex head, bulk	9	+11	
4" thru 14" diam. x 6"			
and shorter	49	41	
9/16" and %" diam. x 6" and shorter	43	39	
%", %", 1" x 6" and shorter	31	20	
*Minimum quantity per 15,000 pieces ¼", 5/16".		n 277	
5,000 pieces 7/16", 14", 2,000 pieces 14", 34", 1"	9/16".	%" dia	n
2,000 pieces %", %", 1"	diam.	-	

#### Machine Screws & Stove Bolts

	Disc	ount
	Mach. Screws	Stove
Packaged, package list Bulk, bulk list	. 27	38
Quantity		
%-in. diam. & under { 25,000-200,00	0 20	61
5/16-in. diam. & larger { 15,000-100,00	0 20	61
All diam. over 3 in. 5,000-100,00	0 —	61

#### Machine Screw & Stove Bolt Nuts

		Dis	count
Packaged, Bulk, bulk	package list	Hex 24	Square 27
	Quantity		
%-in. diam. & smaller	25,000-200,000	18	20

#### CAST IRON WATER PIPE INDEX

	-	-				_	•	•		•	•		-		•	-		-		•	•	-		_				-	-
B	irn	nin	ıg	ha	ın	3							0	0			0			0							1	11	1.2
N	ew	3	0	rk			0							0	0	9		0		0	0		0	0		0	1	12	3.7
C	hic	ag	0					0	0	0	0	0			۰						0						1	13	5.7
Si	an	F	ra	no	di	BC	0	-1	L		Λ	١.								0	0						1	13	4.8
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#### REFRACTORIES

Fire Clay Brick Carloads p	er 1000
First quality, Ill., Ky., Md., Mo., Ol	hio, Pa.
(except Salina, Pa., add \$5.00) No. 1 Ohio	\$122.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	114.00
No. 2 Ohio	98.00
(except Salina, Pa., add \$1.50).	18.00

Silica Brick	
Mt. Union, Pa., Ensley, Ala	128.00
Childs, Hays, Pa	138.00
Chicago District	138.00
Western Utah	144.00
California	151.00
Super Duty	
Hays, Pa., Athens, Tex., Wind-	
ham, Warren, O	145.00
Curtner, Calif.	163.64
Silica cement, net ton, bulk, East-	
ern (except Hays, Pa.)	21.00
Silica cement, net ton, bulk, Hays,	
Pa	24.00
Silica cement, net ton, bulk, Chi-	
cago District, Ensley, Ala	22.00
Silica cement, net ton, bulk, Utah	
and Callf.	32.00

Chrome															net ton
Standard															
ner, Ci	alif		0			D	0	0							101.25
Burned,	Balt.	۰	0		0	0	0				0	۰	0	0	85.00

#### Magnesite Brick

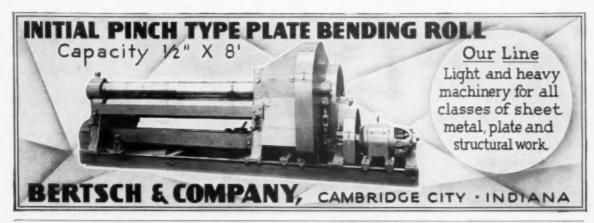
Standard E							
Chemically	bonded,	Baltimore		0	1	02.0	

Grain Ma														31	L.		ķ		-1	b	grains
Domestic, in bulk Domestic,	ñ	n	81	В	1	e	n	n	0	V	e	d				W	71	8.		h	\$64.00
Luning, in bulk in sack																					40.00

Dead F.o.b.											et	ton
Pa.,	W.	Va.,	Ob	lo							\$1	5.00
Mid	west	Val	ley	• •	0 1	 	0	 0 .	 			5.60 4.00

#### METAL POWDERS

Per pound, f.o.b. shipping point. lots, for minus 100 mesh.	in ton
Swedish sponge iron c.i.f. New York, ocean bags Canadian spronge iron,	9.50€
Del'd in East, carloads Domestic sponge iron, 98+%	9.5€
Fe, carload lots Electrolytic iron, annealed,	9.5€
imported 99.5+% Fe	27.5€
domestic 99.5+% Fe Electrolytic iron, unannealed	36.5€
minus 325 mesh, 99+% Fe	57.0€
Electrolytic iron melting stock, 99.84% pure Carbonyl iron size 5 to 10	22.0€
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe 36.0¢	to \$1.55
Aluminum freight allowed	38.00€
Brass, 10 ton lots	61.50€
Copper, electrolytic Copper, reduced	61.50¢
Chromium, electrolytic 99.85%	
min. Fe .03 max. Del'd Lead	\$5.00
Manganese Molybdenum, 99%\$3.00	70.0€
Molybdenum, 99%\$3.00	to \$3.25 \$1.00
Nickel, unannealed Nickel, annealed	\$1.06
Nickel, spherical, unannealed,	
#80 Silicon	\$1.18 43.50¢
Solder nowder 7 0# to 9 0# nius me	et value
Stainless steel, 302	99.0€
Tin	al value
Stainless steel, 302	\$4.50
Zinc, to ton tom	U 08.00€



#### "DAVIS" KEYSEATER

Low in Cost. Durable. Easy to operate. Table adjustable for straight or taper keyways. Three sizes. Keyways 1/16" up to 1".

DAVIS KEYSEATER CO. 400 Exchange St., Rochester B, N. Y.





Cutting Off Machines for Sawing All Kinds of Metals

THE ESPEN-LUCAS MACHINE WORKS FRONT AND GIRARD AVE., PHILADELPHIA, PENNA.

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Sources for every need in the Metalworking industry.

Use reply postcard on Page 113 to request further information on products advertised in this issue.

IRON AGE

#### KARDONG CIRCLE BENDER

For Concrete Reinforcing Bars

This is a powerful and fast machine for heavy duty work in both fabricating plants or in the field where large tonnage is required. It will handle as high as 20 tons a day. Circles of any size required in concrete representations of the power forcing work from 18 inches in diameter up can be bent on this machine. It will bend bars with two or more radius on the



It will bend bars with two
or more radius on the
same bar without stopping
the machine.

Made in two sizes,
Model "C" Capacity

1% inch
Model "CA" Capacity

1 inch
Write for catalog of our
complete line of reinforcing bar benders.

KARDONG BROTHERS, INC. MINNEAPOLIS 13, MINN.



## New ARMSTRONG Adjustable Step Block

ARMSTRONG Adjustable Step Blocks provide safe, rigid, easily adjustable support for setting-up work. Eliminate haphazard set-ups, save time and labor.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People 5209 W. Armsrtong Ave., Chicago 30, U.S.A.

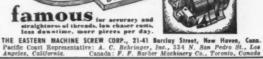


#### DE AULTIPLE SPINDLE

CHUCKING MACHINES

Tool Rotating Type
GOSS & DE LEEUW MACHINE CO., KENSINGTON, CONN





May 17, 1956

# RAILWAY EQUIPMENT FOR SALE

Used - As Is - Reconditioned

## **RAILWAY CARS**

All Types

SERVICE-TESTED ®

# FREIGHT CAR REPAIR PARTS

For All Types of Cars

#### LOCOMOTIVES

Diesel, Steam, Gasoline, Diesel-Electric

#### SPECIAL OFFERING

25 — 70-Ton Capacity, All-Steel Covered Hopper Cars REPAIRED—IMMEDIATE DELIVERY!

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6,000- 8,000- and 10,000-Gallon Cleaned and Tested

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#### RAILS

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New York Office

50-B Church Street New York 7, N. Y. Phone: BEekman 3-8230

"ANYTHING containing IRON or STEEL"

#### News of Used and Rebuilt Machinery

Help Wanted . . . If you're having a difficult time finding a market for used machinery that's big and not over 10 or 12 years old check Los Angeles and San Francisco. And that goes even if the equipment's only in fair-to-middlin' condition.

Dealers here badly need: shears, press brakes, No. 4 to No. 6 mills, big turret lathes, grinders. Los Angeles dealers are chasing around Chicago, Detroit, and New York looking for these and other such items.

Continuing industrial expansion and slow deliveries on some new equipment are bringing more and more firms into the used machinery market. Procurement of good equipment is the problem.

Los Angeles Market . . . In Los Angeles, business is great. Dealers are selling almost everything they can lay their hands on. Sheet metal equipment sales are rolling along. Pacing this are the fast-growing home construction and electronics industries.

Frisco Moving Well... Dealers in the San Francisco Bay Area report business is "darned good." One executive sums it up this way: "Late model used machinery is moving very well, indeed; older stuff, not so hot—but nothing is standing still."

Another big firm says: "April was one of the biggest months we have had since the boom times of 1952." He estimates his used sales are up about 25 pct over the previous month. And he sees no letup in the months ahead. "With order backlogs running anywhere from six weeks to six months, how can the outlook be anything but bright?"

Machine-of-the-Month . . . Best sellers: Saddle turret lathes, kneetype milling machines, horizontal boring mills, press brakes. Some dealers are reaching as far as Chicago and Detroit to fill the high local demand for these items.

Up... San Francisco Bay Area prices of used machinery are moving up with new prices, and, a leading dealer reports, they've taken four or five boosts in recent weeks. Others estimate used merchandise brings about 60 pct of new equivalents, 10 pct to 15 pct higher than a year ago.

Competition . . . Foreign equipment continues to sell well since such machinery can be retailed for about the same price as good used domestic machinery. Most of this merchandise is coming from England, with Germany the runner-up. Italy and Denmark also do well on the West Coast.

Shortage... Much of the used machinery demand in the Bay Area stems from the shortage of new machinery. Buyers, unable to wait, must take what they can get. Quality stuff doesn't sit in warehouses long.

Sound Market . . . Seattle offers a good market for used basic tools, with dealers especially on the lookout for tools in good condition. Only one class of equipment—shapers—is moving slowly at present. Seattle used equipment dealers are doing very little buying outside the region, though they're on the lookout. Much of the activity now is confined to liberal acceptance of tradeins on new machines.

Outlook . . . An encouraging sign: the word in the used equipment trade is that a number of the larger shops are considering expansion programs in the near future.

That should widen the market for new equipment and make a considerable amount of good used equipment available.

Late model items of most machinery and machine tools will find a ready market here.

## CONSIDER GOOD USED EQUIPMENT

BENDING ROLLS

6' x ¼, "Kling Pyramid Type
12' x ½, "Kling Initial Type
13' x ½, "Nies initial Type
14' x ½, "Nies initial Type
14' x ½, "Nies initial Type
14' x ½, "Nies initial Type
15' x ½, "Nies initial Type
16' x ½, "Dreis & Krump No. 186
12' x ½, "Dreis & Krump No. 186
12' x ½, "Dreis & Krump Notor Driven
18' x ½, "Dreis & Krump
18' x ½, "Dreis & Krump
18' x ½, "Dreis & Krump
18' x ½, "English & White
18' x 3/18' Cincinnati
18' X 3/18' X 3/18' Cincinnati
18' X 3/18' X 3

OURHEAD ELECTRIC TRAVELING ECTRIC TRAVELING

28' Span 250 Volt D.C.

48' Span 250 Volt D.C.

55' Span 220 Volt D.C.

80' Span 220 Volt D.C.

80' Span 250 Volt D.C.

96' Span 250 Volt D.C.

96' Span 230 Volt D.C.

80' Span 230 Volt D.C.

80' Span 230 Volt D.C.

80' Span 250 Volt D.C.

96' Span 250 Volt D.C.

96' Span 250 Volt D.C.

87' Span 250 Volt D.C.

87' Span 250 Volt D.C.

87' Span 250 Volt D.C.

88' Span 250 Volt D.C.

89' Span 250 Volt D.C.

89' Span 250 Volt D.C. NES-OVERHEAD

ton P&H
ton Shepard Niles
ton Shepard Niles
ton P&H
ton P&H
ton P&H
ton Cieveland
ton P&H
tom Bhepard Niles
ton Shepard Niles
ton P&H
ton P&H
ton P&H
ton P&H
ton Chevaland
ton P&H
ton Chevaland
ton Shepard Niles
ton Chesapeake 10 ton Despare Nies 2 Span 230 Volt D.C.
13 ton Chesapeake 37 Span 230 Volt D.C.
25 ton Niles 37 Span 230 Volt D.C.
30 ton Hand Opp. 100 Span 230 Volt D.C.
30 ton Hand Opp. 100 Span 230 Volt D.C.
30 ton Hand Opp. 37 Span 230 Volt D.C.
30 ton Hand Opp. 37 Span 230 Volt D.C.
31 Span 230 Volt D.C.
31 Span 230 Volt D.C.
32 Span 230 Volt D.C.
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37 Span 240

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RE-NU-BILT

ELECTRIC POWER

EQUIPMENT A. C. MOTORS 3 phase-60 cycle

SLIP RING Type MT IM MIII MT MT-578

CW CW-960A CW CW-1213 IM-17A MT-424Y MT-5598

20QB IM IM CW

IM-16 IM

REL CAGE

KT-573 2200
FT-559BY 440
CS-1420 2300/4150
IE-15B 1200
IK. 17 440
KT-551 440
LK-551 440
CS-8568 440

2300 2300 2200/12000 2300/4160

G.E. IE-15B 2200
G.E. IK-17 2200
G.E. IK-17 440
G.E. KT-553 440
G.E. KT-553 440
Whose GR-8548 446
Al. Ch. ARW 2200
Whose CR-876C-TEFC 440
SYNCHRONOUS
Whose, 2200

ATI ATI SM TS-7567

TS-7565 TS 2200 TS 2200 8501SL 4000/6900/13 ATI 440 ATI 440

SQUIRREL CAGE

A.C. Al. Ch. G.E. G.E.

G.E.

Whee, G.E. G.E. G.E. G.E. Whee,

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FURNACE
300 KVA Allis Chalmers Induction Melting Furnace
Mercury Are Converter
HAMMERS BOARD DROF—STEAM DROF
STEAM FORGING—800 lb. to 20,000 lb.

LEVELLERS—ROLLER 60" United 17 Bolls 3%" Dia. 72" McKay 17 Rolls 4½" Dia. 84" McKay Type E, 17 Bolls 5½" Dia. MULTI SLIDE MACHINE No. 35 U. S. Multi Slide Machine with Edgewise

a, 35 U. S. M Stock Straighte PRESS-GAP FRAME
125 ton Beatty Inclined Open Back Gap Press, Stroke
11/4" Bed Area 28% x 16%" (New)

Southwark 12" stroke 48" z 25"

11% Bed Area 25% x 10% (New) PRESEE—HYDRAULE 530 ton Baldwin Southwark 12" stroke 48" x 25" Between Columns 1300 ton 4-Coi., 24" Stroke, 40" Bet. Columns 1257 ten Baldwin Southwark Forging Press, Stroke Main Ram, 54" x 41" Bet. Columns 4500 ton B-L-H Hydr. Forging Press, PRESSES-STRAIGHT SIDE

60D-84 Cieveland Double Crank 14" Stroke Bed Area 46" x 84" Clearing Model TF41500-200 Triple Acting Strokes 40, 32, 14", Bed Area 100" x 200"

40, 32, 14", Bed Area 100" x 200"
PUNCH & SHEAR COMBINATIONS
Style EF Clereland 36" Throat, Punch 1½" thru 1"
Style W Cleveland 60" Throat, 812 Ton
ROLLING MILLS
10" x 16" Single Stand, Two High
12" x 16" Phila, Single Stand, Two High
12" x 20" Standard Single Stand, Two High
15" x 25" Farrel Single Stand, Two High

15" x 30" G & M Single Stand, Two High 16" x 24" Farrel Two Stand, Two High 12" x 12" x 40" Lowis 3. High Sheet Mill 12" Three High Bar Mill 26" x 54" United Single Stand, Two High 8" Torrington Ring Type Reversing Mill For cold reducing 7" wide strip For cold reducing 7" wide strip

BHEAR-BAN
Pels Type 18-23, Capacity 2" Rd., 1%" Sq. SHEAR-BILLET
No. 7 Hilles & Jones, Motor Drive, Cap. 5" Sq.

SHEARS—GATE 80" x %" Pels 86" x 1" Hilles & Jones S6" X 1" Hillies & Jones SHEAR—ANGLE 6 x 6 x %" Cleveland SHEARS—SQUARING 12" x 3/16" Cincinnati #1412 12" x %" Niagara, NEW 1951 12" x %" Steelweld

Equipment

12 2 78
SLITTERS
36" Yoder Slitting Line
G-48 Yoder Gang Slitter, 5" Threaded Arbor

STRAIGHTENERS
Kane & Roach 2 Roll Rotary Straightener, M.D.
Capacity Midsteel % to %
Kane & Roach 5-Roll Rotary Straightener Model 5250
86° Haliden Strip Straightener & Cui-Off
Actan Standard 12 Roll Straightener. Capacity 3%
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60,000 MACHINES
60,000 and 300,000 Olsen & Richle Universal
50,000 and 300,000 to Compression
WIRE DRAWING MACHINE
Syncro BCS 14 Die Wire Drawing Machine with
Spooler & Blocks, Entering Size Max. .103", Finish
Min. .0104" low carbon steel

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Manufacturing

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#### REBUILT - GUARANTEED ELECTRICAL EQUIPMENT

MOTOR GENERATOR SETS

Qu.	KW	Make	R.P.M	D.C. Velts	A.C. Volts
1	2500	Whae.	720	600	4169/2300
1	2000	Al. Ch.	720	250	4160/2300
1	1200	Whse.	720	600	2300
1	1120	Elliott	720	260/280	2300
1	500	G.E.	1200	250	2300/440
1	500	Ch. Wh.	720	575/600	2300/440
1	300	G.E.	1200	250/275	2300
1	200	Elliott	1200	125	4000/2300
1	150	G.E.	1200	250	2300/440
1	120	Whae.	1200	250	2300/440
1	100	Al. Ch.	1200	250	4000/2300

DIRECT CURRENT MOTORS

Qu.	H.P.	Make	Туре	Volts	R.P.M.
2	3000	Whse.	Mill	525	600
6	1500	Whse.	Mill	525	600
4	700	Whee,	Mill	250	300/700
2	600	Al. Ch.	Mill	600	300/600
2	600	Whae.	Mill	230	110/220
2	500	Whee.	MIII	259	285/710
1	450	Whse.	8K	230	450/600
1	350	G.E.	CD-169	230	1150
1	300	Whse.	MIII	230	300
- 4	275	Whee.	QM	239	425/850
1	200/250	El. Dy.	Ped. Brg.	230	400/1200
1	200	Whee.	8K-210	239	400/800
1	180	G.E.	MPC	230	400
1.	150	Whse.	8K-201	230	300/900
2	125	Whee.	SK-184	230	575/850
1	125	G.E.	MPC	230	400/600
1	100	El. Dy.	30-8	230	450/1350
2 2 1 1 1 1 1 1 1 1 2 1 1 2 1 1 2	100	El. Dy.	30-8	230	475/950
1	80	Reliance	651-T	230	575/1150
1 1	60/80	El. Dy.	258	230	525/1150
1	40	G.E.	CD-123	230	500/1000
1	40	Whae.	SK-140	230	599/1700
1	321/4	Whse.	SK-150	230	400/1200
2	25	Whae.	8K-93	230	1800
1	20	Cr. Wh.	D.P.B.B.	230	1150/2400
1	20	Whee,	SK-123	230	400/1200
1	15	G.E.	CD-85	230	575/23:10
3	15	Whse,	SK-100L	230	500/1500
1	15	Reliance	155-T	230	400/1600
1.	10	Whae.	8K-108	230	400/1600
1	10	Al. Ch.	E-122	239	300/1200
4	10	Whse.	8K-91	230	250/1000
1	71/4	G.E.	CD-75	238	690/2070
1	716	G.E.	CD-85	230	450/1350
4	5/7%	Reliance	T.E.F.C.	230	337/1350

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4302 Clarissa St., Philadelphia 40, Penna. Cable Address
"Macsteel" Philadelphia, Pa. Phone Devenpart 4-8300 SELECT MACHINE TOOLS

Surplus Mfg. Equipment Inventories Purchased

GRINDING MACHINES
72" Hanehott 3-apd. rotary surface, new 1948.
13" x 60" Blood 300 Hanehott vert. apdl., lete.
14" x 36" Pratt & Whitney hyd. vert. surface, 1942.
39" No. 18 Blanchard rotary surface, new 1941.
No. 72A3 Haudi hyd. pl. internal, extraced bridge,

1943. No. 74 Heald hyd. pl. internal, X-eliding H.S., 1941. No. 72A3 Heald hyd. pl. internal, X-sliding H.S., 1941.

1941. 12" x 24" Cincinnati ER hyd. universal cyl., 2U3B1M-5. 14" x 30" Landis type C hyd. pl. cylindrical, 1942. 6" x 30" Cincinnati EA Filmatic pl. cylindrical, 1942.

HAMMERS
No. 6-1 Nazel, preumatic, late
No. 5-N Nazel, self-contained.
No. 88 Nazel, self-contained.

No. OB RADE, Self-Containes.

LATHES

No. 3 Gishelt Univ. Turnet Lathes (2), 1942.

24' x 8' Lellond H. D. ongine lathe.

14" x 8' Hendey Toolroom, 1948.

15" x 30" Lips Carbo-Matle, 1942.

12" x 30" CC Miles Beneart Pend engine lathe, 90HP

M.D.

9" swing Betts Bridgeford H.D. engine lathe, lats.

PLANERS PLANERS
36" Reskford Hyd. Openside Shaper-Planer.
42" x 42" x 12' Liberty dbi. housing planer, 35 HP
M.D.
48" x 48" x 18' Gray Maxi-Service.

PRESSES
50 tan No. 921/5C Toledo D.C. Str. Slde.
50 tan No. 786/5-72 Toledo D.C. Str. Slde.
500 tan No. 1866 Hamilton D.C. adj. bed. 60" x 102".
500 tan No. 1858 Hamilton D.C. adj. bed. 60" x 102".

SHAPERS & SLOTTERS 24" Gould & Eberhardt Universal. 32" G & E Invincible, F.M.D., late type.

W & E invinctore, r.m.D., take type. Rockford spenside hyd, shaper-planer, ser. PMU35. Rockford hyd. vertical slotter, new 1944.

UPSETTERS ETTERS Ajax suspended slides, steel frame. National Upsetter, guided ram, hard ways. ational Upsetter, guided ram, air eluteh.

> 1000 Tools in Stock Free Illustrated Catalog

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PHONE SAGINAW 2-3105 2041 E. GENESEE AVE. SAGINAW, MICH.

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47 Howell Street, Jersey City 6, N. J.

18 Ton Cleveland Crane, 45'0" span, 250 VDC with meter generator set. Cape Castrolled. 5-bss P & H crane, 3-meter, 45'0" span, 220 vs. 3 ph. 180 Other Cranes, various span. JAMES P. ARMEL, Crane Specialist 718 House Bids. Pittsburgh 22. Ps. Telephone: Gr. 1-4449 BENNETT MACHINERY CO.

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I--128" Swing x 50' Between Centers Niles Bemeat Pond Heavy Duty Engine Lathe-90" ever ear., 2 ear., eah with 15 h.p. meter, Drive meter 80 h.p., bed in four sections.

375 Allwood Rd., Clifton, New Jersey

6' arm 19" col. CARLTON RADIAL DRILL. 48 Spindle Speeds 10 to 1000 RPM. 20 HP. A.C. Motor Drive. New in 1943. Inspection under power.

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## ROLLING MILLS—STEEL WORKS EQUIPMEN

-34" & 22" x 112" 3-HIGH PLATE MILL with front and back tilting tables, 1500 HP meter and gear set; also 84" 3-high jump mill, -30" x 97" BLOOMING OR SLAB MILL, 2-HIGH reversing.

" x 90" SCALE BREAKER with power screw-

dewn.
1-28" 2-HIGH PINION STAND, modern design.
3-16'/2" PINION STANDS, for het strip mill.
3-4-HIGH HOT STRIP MILL STANDS, for up to

76" width. -12" & 22" x 40" 3-HIGH HOT SHEET ROUGH-ING MILL.

ING MILL.

-20" x 20" 2-HIGH COLD MILL, with gear set
and metre.

-16" x 24" COLD MILL, 2 stands, 400 HP gear set.

1—16" X S \*\* CULD WILL, 2 stands, soor "F gear set." 1—10" x 10" 2-HIGH COLD MILL, modern com-bination pinion stand and gear set. 1—24" BAR MILL, 3-HIGH, 3 stands, with variable speed D.C. molve, traveling tifting tables, relier tables, saws, bloom shear, furnase. 3—18" BAR MILL STANDS, 3-high. 1—10" ROD MILL, 19 passes.

controls.

2-ROLLER LEVELERS, McKay, rolls 89" face x 51/4" dia., driven through gear box and universal

spindles.

—CORRUGATING MACHINE for 12 ft. sheets, Stamee = E. with 5 sets of dies.

—PICKLING MACHINE for sheets, Taylor design.

—44" ROLL LATHE, enclosed headstock, tailstock, plane rest. 29 HP, 500/1500 RPM, 230 volts D.C. motor and centrels.

1-36" ROLL LATHE, enclosed headsteck, 25 MP, 400', 1200 RPM D.C. meter.

2-PACK FURNACES for hot sheet mills, 62" x 60',

double chamber.

16—AJAX electric induction melting furnace, 2000 lbs. each.

1—3-TON LECTROMELT electric melting furnace,

I—UNITED #4 vertical open side bar shear.
I—UNITED PLATE SHEAR, capacity 9/16" x 156".
I—SHEET SQUARING SHEAR, Mosta, %" x 156".

a-SHEET POLISHING MACHINES, Mattison, 38" x 120" and 48" x 120".

I-DRAWBENCH, 50,000 ib. casacity, 150 HP D.C. motor and M-G set.

I-SI SUTTON STRAIGHTENER, 5 roll, for bars and tubes. COKE OVEN PUSHER, used very little, excellent

314 RPM.
1—1200 HP MOTOR, 2200 volts, 3 phase, 60 cycle,
353 RPM.
4—TINNING UNITS for het dipped tin plate.
1—DOWN-COILER for het strip up to 48" wide.

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Ajax & National Upsetters, suspended slide, 2½", 3", 4"; similar upsetters not suspended slide, ¾", 1", 1½", 2", 3"

5" Acme Upsetting & Forging Machines sus-pended slide, cam side die slide

700-ton Ajax High Speed Forging Press

50.000# Standard Double Draw Bench

#3 Abramson Bar & Tube Straightener

Peis FV-75 Bar & Biller Shear, Cap. 75%" rd 10' x 1/2" Plate Shear, Long & Allstatter 10" throat, M.D. Rebuilt

10' x 1" Long & Allstatter Plate Shear

Hilles & Jones and Buffalo Shears 11/2", 2", 2", 2", 3", 3", 3", 4", 4" and 41/4"

1600 & 2750# Chambersburg Model F Board Drop Hammers, Roller bearing; double V-ways, Built 1943

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Bradley Hammers, various sizes, including 500# Upright

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Single and Double End Punches Multiple Punches

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BOLT, NUT AND RIVET MACHINERY, COLD HEADERS, THREAD ROLLERS, THREADING MACHINES, TAPPERS, COLD BOLT TRIMMERS, SLOTTERS, HOT HEADERS AND TRIMMERS, COLD AND HOT PUNCH NUT MERS, CO

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No. 2 Hilles & Jones Horizontal Punch, m.d.
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No. 6/2 Hilles & Jones Punch & Shear, single end, type C
Cleveland Shear, 72" gap, 18" blade, 1" plate Cleveland Type G Vertical Punch, 72" throat,

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-50 ton Ladde Crane. Morgan, 15 ton garx. helst,
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#### WORLD'S LARGEST STOCK

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### PYRAMID TYPE PLATE BENDING ROLLS



SOUTHWARK 27'x1" Plate; Drop End Type; Top Roll 28" Dia. Bottom Rolls 20" Dia. Drive Motor 100 H.P. Adj. Motor 40 H.P. 230 Volts D C; App. Wt. 250,000 Lbs.

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SOUTHWARK Jaggling Press: All Steel; Ver. Ram 350 ton Cap. 12" Str. (Str. may be extended to 18") Hor. Ram 150 ton Cap. 24" Str. 1500 P.S.I. App. Wt. 55,000 Lbs. Oil or Water Pumping Equipment Available: Drawing upon Request.

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OILGEAR (4) Type CG 10017; 885 R.P.M. Cap. 108 G.P.M. @ 2000 P.S.I

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DeLAVAL; Type IMO; Motor-Pump; Cap. 29 G.P.M. @ 600 P.S.I. WORTHINGTON & PACIFIC; (12) Centrifugals; UNUSED Sizes to 6".

#### **ACCUMULATORS**

Tested to 5000 P.S.I. 3'x10'; 4'x11'; 21"x36'; 22"x48'.

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Cap. 50 ton @ 40' Rad. All Steel; 50' long. Wt. 100 tons; Self Propelled; 50' and 90' Booms; Steam; Oil Fired; Photographs upon Request.

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Side Adjustment Cap. 41/2" On Edge, 81/2" Flat A. C. Motor & Controls LIKE NEW

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#### PRACTICALLY NEW DOUBLE CRANK PRESSES

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Bliss No. 9-108W, cap. 400 tons, Bed 108" x 40". Bliss No. 8-120, cap. 290 tons, Bed 120" x 50". Minster No. 50-7-72, cap. 200 tons, Bed 72" x 50". Bliss No. 8-84W, cap. 160 tons, Bed 34" x 35". Bliss Toledo No. 931/3-J, cap. 140 tons, Bed 108"

ALL MACHINES HAVE AIR CLUTCH AND SOME HAVE AIR CUSHIONS AND MOTOR DRIVEN RAM ADJUSTMENTS. STILL SET UP IN PLANT.

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#### STEEL BUILDING

50'0" x 200'0" with 15 ton AC floor operated crane, mfd 1943, 25'3" under eaves, 20'0" c to c columns. Immediate delivery.

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### Industrial **Heat Treat Furnaces**

G F. ROLLER HEARTH 465 KW. 1650 deg. F. 5' wide. 18" high, 20' long & 40' cooling.

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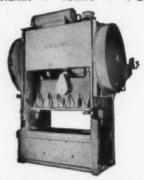
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#### **Another Titanium Price Cut**

Titanium Metals Corp. has cut prices of titanium sponge metal 20¢ per lb to \$3.25. It was the fourth such cut in 14 months. TMC also reduced mill product prices about 6 pct — with reductions ranging from 65¢ per lb to \$1 per lb. Repricing will save major TMC customers more than \$2 million, the company said.

#### Government Backs Big Nickel Expansion

Office of Defense Mobilization is holding out the lure of fast tax write-offs to boost nickel capacity. Guaranteed purchase orders also are being offered. Plans call for increasing present world capacity of 300 million lb per year to between 400 and 450 million lb. Nickel supply, already tight, is expected to grow tighter in months ahead.

#### Strike Situation In Steel

Strike in Tennessee Coal & Iron Div. plants is costing consumers some 70,000 tons of steel per week. Walkout of transportation workers, beginning April 26, has created critical shortages for some consumers in the South. Meanwhile, short-lived walkout at Bethlehem plant of Bethlehem Steel cost 20,000 tons before workers returned to jobs. Wildcat strike was over incentives.

#### Aluminum In Venezuela

Venezuela's Ministry of Mines says important deposits of bauxite have been located in the State of Bolivar. It estimates the Piar district contains 10 million tons. Samples are said to show a 40 pct aluminum content, 27 pct iron oxide and low silicon content.

#### Steel Labor "Serious" On Weekend Pay

Steel Worker Chief David McDonald says his union is serious about getting premium pay for week-end work in forthcoming negotiations with steel producers. "This is the break-through year on premium pay for work on week ends," says McDonald. The union also wants a "substantial" pay boost — and "hopes" there will not be a steel strike.

#### Alcoa To Spend \$600 Million

Aluminum Co. of America contemplates spending of \$600 million for expansion during the next five years. I. W. Wilson, Alcoa president, says present market trends indicate need for continuing expansion. "Our present estimate, although not fully authorized, indicates possible capital expenditures of about \$600 million for the five-year period from 1956 through 1960, inclusive," he said.

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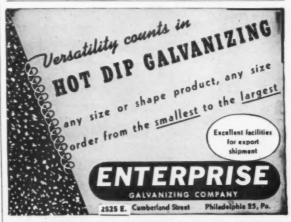
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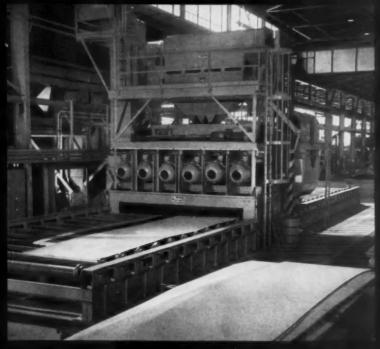
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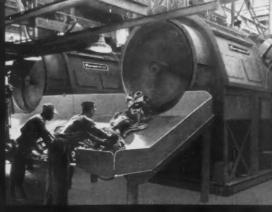
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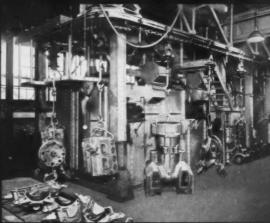
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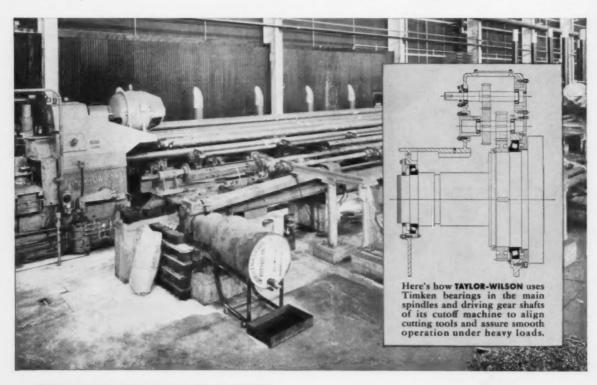
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